# Coverage
1996 Census Technical Reports

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# Coverage

## 1996 Census Technical Reports

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# I. Introduction

The 1996 Census required the participation of the entire population of Canada, some 29 million people distributed over a territory of 9.2 million square kilometres. Although there are high quality standards governing the gathering and processing of the data, it is not possible to eliminate all errors. In order to help users assess the usefulness of census data for their purposes, the *1996 Census Technical Reports* detail the conceptual framework and definitions used in conducting the census, as well as the data collection and processing procedures employed. Also, the principal sources of error, including where possible the size of these errors, are also described, as are any unusual circumstances which might limit the usefulness or interpretation of census data. With this information, users can determine the risks involved in basing conclusions or decisions on census data.

This *1996 Census Technical Report* deals with **coverage errors** which occurred when persons, households, dwellings, or families were missed by the 1996 Census or enumerated in error. Coverage errors are one of the most important types of error, since they affect not only the accuracy of the counts of the various census universes, but also the accuracy of all of the census data describing the characteristics of these universes. **Users of census data should be aware that the presence of coverage error in the 1996 Census means that tabulations may present the results of a less than complete enumeration. This is particularly so for groups with a significant coverage error. Users are directed to Chapter IV to obtain estimates of population and household coverage errors for a variety of demographic and geographic variables.**

Chapter II defines the census universes that the census attempts to cover. Chapter III describes the collection and processing procedures in which coverage errors may occur as well as the steps taken to control such errors. Chapter V gives an overview of the Coverage Error Measurement Program for the 1996 Census, whereas Chapters VI through IX describe the methodology and results of each coverage study. Chapter X describes how the results of the four studies are combined to form estimates of coverage error and gives further estimates. Chapter XI provides a historical perspective and Chapter XII presents an evaluation of the largest coverage study, the Reverse Record Check.

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Users will find additional information on census concepts, variables, and geography in the *1996 Census Dictionary* (Catalogue No. 92-351-XPE) and an overview of the complete census process in the *1996 Census Handbook* (Catalogue No. 92-352-XPE).

# II. Census Universes

## A. Introduction

The 1996 Census involved the enumeration of the following five universes:

1. the population universe;
2. the dwelling universe;
3. the household universe;
4. the census family universe; and
5. the economic family universe.

The 1996 Coverage Error Measurement Program addresses the population, dwelling, and household universes.

This chapter defines the various universes to provide a reference against which coverage errors may be measured. Readers are also referred to the 1996 Census Dictionary, which contains more detail on the variables associated with each universe.

## B. Population Universe

The following groups of persons were included in the population universe of the 1996 Census:

- Canadian citizens and landed immigrants with a usual place of residence in Canada;
- Canadian citizens and landed immigrants who are outside Canada as employees of the Canadian government (federal or provincial) or members of the Canadian Armed Forces, and their families;
- Canadian citizens and landed immigrants at sea or in port aboard merchant vessels under Canadian registry; and
- non-permanent residents:
  - persons in Canada claiming refugee status;
  - persons in Canada who hold a student authorization (foreign students, student visa holders);
  - persons in Canada who hold an employment authorization (foreign workers, work permit holders);
  - persons in Canada who hold a Minister's permit (including extensions); and
  - all non-Canadian born dependants of persons claiming refugee status or of persons holding student authorizations, employment authorizations, or Minister's permits.

The following groups of persons, known collectively as foreign residents, were not included in the population universe of the 1996 Census:

- government representatives of another country attached to the embassy, high commission, or other diplomatic body of that country in Canada, and their families;
- members of the Armed Forces of another country who are stationed in Canada and their families; and
- residents of another country visiting in Canada temporarily.

Since the 1991 Census, non-permanent residents are included in the population universe. Previously, non-permanent residents were considered to be foreign residents and were not included in the population universe. Users should bear this in mind when making comparisons of data from 1991 and 1996 to data from previous censuses.

The above definitions indicate which persons should be included in the census, but not where these persons should be enumerated. For this purpose, the Canadian census uses the *de jure* method of enumeration, whereby persons are to be enumerated at their usual place of residence, even if they are temporarily away at the time of the census. Persons away from their usual place of residence and residing elsewhere in Canada are called temporary residents (not to be confused with "non-permanent residents" which refers to the legal status of the person while in Canada). Persons without a usual place of residence are to be enumerated wherever they happen to be on Census Day. Some other countries use the *de facto* method, whereby all persons are to be enumerated wherever they are on Census Day, regardless of their usual place of residence.

## C. Dwelling Universe

A dwelling is defined as a set of living quarters in which a person or group of persons resides or could reside. Only dwellings in Canada are included. There are two types of dwellings:

- A private dwelling is a separate set of living quarters with a private entrance either from outside or from a common hall, lobby, vestibule or stairway inside the building. The entrance to the dwelling must be one which can be used without passing through the living quarters of someone else.

- A collective dwelling is a dwelling of a commercial, institutional or communal nature. It may be identified by a sign on the premises or by a census representative speaking with the person in charge or with a resident or a neighbour, etc. Included are rooming- or lodging-houses, hotels, motels, tourist homes, nursing homes, hospitals, staff residences, communal quarters of military camps, work camps, jails, missions, group homes, and so on.

These two main types of dwellings are subject to more detailed classifications:

- Private dwellings can be regular private dwellings, marginal dwellings, or dwellings under construction. Regular private dwellings are further classified into three groups: dwellings occupied by usual residents, dwellings occupied solely by foreign or temporary residents, and unoccupied dwellings. Marginal dwellings and dwellings under construction are classified as occupied by usual residents or occupied solely by foreign or temporary residents. Marginal dwellings and dwellings under construction that were unoccupied on Census Day are not included in the dwelling universe.

- Collective dwellings are classified into dwellings occupied by usual residents, dwellings occupied solely by foreign or temporary residents, and unoccupied collective dwellings. In the case of unoccupied collective dwellings, data were collected but are not included in census products.

In summary, the dwelling universe included:

- regular private dwellings occupied by usual residents;
- regular private dwellings occupied solely by foreign or temporary residents;
- regular private dwellings that are unoccupied;
- marginal dwellings or dwellings under construction, provided they were occupied on Census Day;
- collective dwellings occupied by usual residents; and
- collective dwellings occupied solely by foreign or temporary residents.

The dwelling universe did not include:

- marginal dwellings or dwellings under construction that were unoccupied on Census Day;
- collective dwellings that were unoccupied on Census Day; and
- dwellings outside Canada.

# D. Household Universe

The term "household" refers to a person or group of persons, other than foreign or temporary residents, who occupy the same dwelling and do not have a usual place of residence elsewhere in Canada. It may consist of a family group (census family) with or without other non-family persons, of two or more families sharing a dwelling, of a group of unrelated persons, or of one person living alone. Household members who are temporarily absent on Census Day are considered to be members of the household at their usual place of residence. For census purposes, every person is a member of one and only one household.

Households are classified into three types depending on the type of dwelling in which they reside: private households, collective households, and households outside Canada. Note that households outside Canada are not associated with a dwelling, since dwellings outside Canada are not included in the dwelling universe. Most published census data on households refer to private households only.

# E. Census Family Universe

The term "census family" refers to:

- a now-married couple with or without never-married sons and/or daughters of either or both spouses living in the same dwelling;
- a couple living common-law with or without never-married sons and/or daughters of either or both partners; or
- a lone parent of any marital status, with at least one never-married son or daughter living in the same dwelling.

Census families are reported only for the population in private households, Hutterite collective households, and households outside Canada.

## F.  Economic Family Universe

An economic family is defined as a group of two or more persons who live in the same dwelling and are related to each other by blood, marriage, common-law, or adoption. Economic families are reported only for the population in private households and Hutterite collective households.

## G.  Relationships of Universes

Table 2.1 gives a summary of the three basic universes according to the location of the dwelling (in Canada or outside Canada), the classification of the dwelling (private or collective), and its occupancy status. For each group in the table, an indication is given as to whether it is included or excluded from each universe. For example, Canadian government employees living outside Canada with their families are included in both the population and household universes but excluded from the dwelling universe. Categories flagged with an asterisk (*) represent groups for which data are collected but which are excluded from most census products.

**Table 2.1 Population, Household, and Dwelling Universes and Their Relationships**

| | Population | Households | Dwellings |
|---|---|---|---|
| **Dwellings in Canada** | | | |
| 1.  Private Dwellings – Regular | | | |
| • occupied by usual residents | I | I | I |
| • occupied solely by foreign or temporary residents | E | E | I* |
| • unoccupied | - | - | I* |
| 2.  Private Dwellings – Marginal or Under Construction | | | |
| • occupied by usual residents | I | I | I |
| • occupied solely by foreign or temporary residents | E | E | I* |
| • unoccupied | - | - | E |
| 3.  Collective Dwellings | | | |
| • occupied by usual residents | I | I* | I* |
| • occupied solely by foreign or temporary residents | E | E | I* |
| • unoccupied | - | E | E* |
| 4.  Vacancy Check random additions | I | I | I |
| **Dwellings Outside Canada** | | | |
| 5.  Canadian citizens and landed immigrants who are abroad, either on a military base or attached to a diplomatic mission | I | I* | E |
| 6.  Canadian citizens and landed immigrants at sea or in port aboard merchant vessels under Canadian registry | I | I* | E |

I = included, E = excluded, - = Not applicable
* Data were collected but are not included in most products.

# H. Coverage Errors

Coverage errors may be defined as errors that affect the accuracy of the counts of the various census universes. There are two types of coverage errors: undercoverage and overcoverage. Undercoverage occurs when a unit that is a part of a census universe is completely missed by the census. Overcoverage, on the other hand, may occur in two ways. First, and most common, is the situation where a unit that is part of a census universe is enumerated more than once. Secondly, a unit outside the census universe (e.g. a foreign resident, a fictitious person, or an unoccupied marginal dwelling) may be erroneously enumerated. A geographic error alone does not constitute a coverage error. That is, a person who is enumerated in the wrong geographic area does not constitute overcoverage for the area in which the person was enumerated and undercoverage for the area in which the person should have been enumerated.

Undercoverage of a household is defined as the situation where all persons in the household are missed. Situations where some but not all of the persons in the household are missed are not considered as household undercoverage, even though they cause an error in the characteristics of the household, such as its size or composition. Similarly, overcoverage is defined as the situation where all members of the household are enumerated more than once.

Undercoverage, overcoverage, and the net of the two, net undercoverage, are most usefully expressed as rates of the population that should have been enumerated in the census. Mathematically, let $T$ represent the total or "true" number of units in the universe in question, and let $C$ be the published census count for this universe. Since the concept is the same for persons, households, dwellings or families, we will therefore use the general term "units." The error resulting from the use of $C$ instead of $T$ is then:

$$N = T - C$$

This error is called the **net coverage error**.

Let $U$ denote the total undercoverage; that is, the total number of units in the universe in question that were missed in the census, and let $E$ denote the total number of units in the universe that were enumerated at least once. Then

$$T = U + E$$

and therefore

$$N = (U + E) - C$$
$$= U - (C - E)$$
$$= U - O$$

where the term $O = C - E$ is defined as overcoverage. This error results not only from counting units more than once, but also from counting units that are outside the universe in question.

Expressed as a proportion of the total number of units in the universe in question, the rates of coverage error are:

(a) **undercoverage rate:** $R_U = U/T$;
(b) **overcoverage rate:** $R_O = O/T$;
(c) **net undercoverage rate:** $R_N = N/T$;

so that

$$R_N = (U - O)/T = R_U - R_O$$

A positive net undercoverage rate indicates that undercoverage is larger than overcoverage, whereas a negative net undercoverage rate indicates that undercoverage is smaller than overcoverage. In most cases, undercoverage is larger than overcoverage. Thus, most net undercoverage rates will be positive.

# III. How the Census is Conducted

Census operations leading to a set of data for dissemination can be divided into two main stages: collection and processing. This chapter describes these two stages, as well as the steps taken to minimize and control coverage error.

## A. Collection

The purpose of the collection stage is to enumerate the dwelling, household, and population universes and to collect the required information about each enumerated unit. This is achieved by first listing all dwellings in a Visitation Record, classifying them as either private or collective dwellings, and specifying their occupancy status (occupied or unoccupied). Once this operation is completed, the census questionnaire is administered. This questionnaire asks a member of the household to list all usual occupants of the dwelling included in the population universe (even if temporarily absent on Census Day) and to report their characteristics.

To carry out this stage, the country was divided into approximately 49,400 enumeration areas (EAs). Each EA was assigned to a census representative (CR) who was specially trained to carry out the collection activities. The average assignment per CR was about 300 households.

Two collection methods were used: mail-back and canvasser. The mail-back methodology was used in all areas of the country except for special core areas of major cities, remote areas, and most Indian reserves and settlements, where the canvasser method was used. In both methods, the CR was required to identify and list all dwellings and to drop off or complete an appropriate census form.

With the mail-back methodology, the CR dropped off a questionnaire. The household was instructed to complete it as of May 14, 1996 and to return it through the mail. The returned questionnaires were edited, and, if necessary, were followed up by telephone or in person to complete missing information. Households for which questionnaires were not received were followed up by telephone or in person to complete their questionnaires.

In the canvasser method, data were collected by personal interviews at the same time the dwelling was enumerated by the CR. During the interview process, the CR ensured that the relevant questions were completed. Canvasser areas represented about 1% of the total population of Canada.

In Eastern Ontario, a study was conducted to evaluate the efficiency of the mail-out and mail-back method. The region involved in this study is called the Centralized Edit Area. It contains a population of approximately 1 million persons. The first step was to create a list of all the dwellings before Census Day so as to establish a list of addresses. The questionnaires were then mailed out two weeks prior to Census Day. Households were instructed to complete their questionnaire as of May 14, 1996 and to return it through the mail. The returned questionnaires were edited and, if necessary, were followed up to complete missing information.

In addition to the basic demographic and housing data that were collected from all households, additional data were collected for a sample of households. In most mail-back areas, the CR delivered a long questionnaire to every fifth occupied private dwelling (a 20% sample). In canvasser areas, except in special core areas of major cities and in some other special circumstances, the long questionnaire was used for all households in the EA. In the Centralized Edit Area where the mail-out and mail-back method was studied, a long questionnaire was mailed to every fifth occupied private dwelling.

Following the completion of collection by the CR, the work was checked by the CR's supervisor (the Census Commissioner) and by a Quality Control Technician. Once the work was approved, the questionnaires and visitation records were forwarded to the data processing operations.

## B.  Data Processing

The data processing stage resulted in a final census database from which the census tabulations were retrieved. In the 1996 Census, there were five stages of processing.

### 1.  Regional Processing

This stage was conducted in six of the regional centres of Revenue Canada. The operations consisted of preparing the questionnaires for key entry. In particular, write-in responses to the industry and occupation questions were assigned numeric codes. An independent verification of a sample of records was established to control the quality of the coding.

### 2.  Direct Data Entry

Data from the questionnaires were keyed in and then transmitted electronically to Revenue Canada headquarters in Ottawa where they were stored on magnetic cartridges and transported to Statistics Canada on a daily basis. Again, an independent verification (with correction) of a sample of each batch of work was used to control the quality of the keying operation.

### 3.  Head Office Processing

This stage consisted of several automated and manual operations designed to identify and correct inconsistencies among counts of dwellings, households, and persons at the EA and household level. Inconsistencies found by the system were resolved by consulting the census questionnaire. This stage also included the special processing of persons enumerated outside Canada or on ships. The final step was to load the data onto a database.

### 4.  Automated Coding

In this stage the write-in responses to certain questions (e.g., mother tongue, place of work, ethnic origin) were converted to numeric codes using an automated system. The write-in responses were keyed in during direct data entry, and the captured write-in responses were matched against an automated reference file containing a series of words or phrases and the corresponding numeric codes for each variable. Responses that could not be coded by the automated system were resolved by processing staff and coding consultants using a computer-assisted process. Again, quality control procedures were used to control the quality of the coding operations.

### 5.  Edit and Imputation

At this stage, problems arising from inconsistent or missing data were identified and corrected. Such errors may arise as a result of the respondent answering the questions incorrectly or incompletely, or they can arise from subsequent processing activities. Once the editing detected an error (for example, a married five-year-old), imputation was performed to resolve the problem. The data collected on a 100% basis were edited and imputed first, followed by the 20% sample data. It was also at this stage that the 20% sample was weighted up to the full population. Once the data were imputed and weighted, they were loaded to a final census database from which tabulations were produced.

## C.  Sources of Coverage Errors and Their Control

In most cases, coverage errors occurred during the collection stage. For example, undercoverage of persons and households occurred when occupied dwellings were missed completely or when they were misclassified as unoccupied. Population undercoverage also occurred when a person was missed within an enumerated household (i.e. some members

were missed). Overcoverage can occur when there is uncertainty about a person's usual place of residence, for example a university student who is enumerated at both the parental home and the university residence.

Coverage errors can also be introduced during the processing stage when records for persons or households are erroneously cancelled, lost, or artificially created.

These potential sources of errors were recognized during the planning of the 1996 Census, and the following control measures were taken to minimize them:

(a)   careful definition and mapping of enumeration area (EA) boundaries to ensure no areas were left out or included twice;

(b)   instructions in the CR's manual on how to canvass his/her EA so as to minimize the risk of missing dwellings;

(c)   creation of an address register from sources independent of the census and the use of this list by the CR to check if any dwellings were missed;

(d)   pre-identification of collective dwellings that were to be checked out by field staff to ensure that, if occupied, they were covered in the census;

(e)   special procedures to enumerate persons who have difficulty responding (e.g. difficulty in English and French or literacy problems) and who are located in special core areas of major cities;

(f)   special procedures to enumerate the population on Indian Reserves;

(g)   publicity messages to inform Canadians about the census, including what to do if they did not receive a questionnaire;

(h)   instructions on "Whom to Include" on the census questionnaire to remind respondents of who should be included;

(i)   questions on the census questionnaire asking if there were any persons the respondent was not sure whether or not to list, and a follow-up to assist the respondent in these cases; and

(j)   adjustments to the final census counts to account for the specific component of undercoverage measured by the Vacancy Check.

These procedures, along with appropriate training, supervisory checks, and quality control systems, helped to reduce the number of coverage errors, but failed to eliminate them completely; hence the importance of evaluating the level of coverage errors.

**In the 1996 Census, a specific coverage error occurred which users should be aware of. On some Indian reserves and Indian settlements, enumeration was not permitted or was interrupted before it could be completed. Moreover, some Indian reserves and Indian settlements were enumerated too late to be included, or the quality of the collected data was considered inadequate.** A similar problem occurred in the 1991 and 1986 Censuses and, to a lesser extent, in the 1981 Census as well. These Indian reserves and Indian settlements (a total of 78) are called incompletely enumerated Indian reserves and Indian settlements. Data are not available for these areas and are not included in 1996 Census products. Notes are provided in the products containing data for geographic areas with one or more of these Indian reserves or Indian settlements. A list of these reserves and settlements along with population and occupied private dwelling counts from the last two censuses (where available) is given in the appendix section of census

products. Though these Indian reserves are not included in the 1996 Census products, population estimates for them, based on a statistical model, are produced for population estimates. See Hamel (1997) for more information on estimating the population and the number of occupied private dwellings on Indian reserves that were partially enumerated in the 1996 Census.

# IV. 1996 Census Net Undercoverage Estimates

The 1996 Census population net undercoverage rate was 2.45%. This means that, on a net basis, the Census missed 2.45% of the persons (723,486 persons) that it should have enumerated. The population undercoverage rate of 3.18% was offset by the population overcoverage rate of 0.74%. The latter rate indicates that 0.74% of the persons actually enumerated by the census were enumerated in error whereas the former rate indicates that 3.18% of the census target population were not enumerated. The 1996 Census household net undercoverage rate was 2.19% (242,647 households). The household undercoverage rate of 2.49% was offset by a household overcoverage rate of 0.30%.

This chapter presents estimates of net undercoverage for a variety of census characteristics. The tables in this chapter show the estimated net undercoverage with the estimated standard error and the net undercoverage rate with the standard error for each characteristic listed. Table 4.1 gives estimates for persons and Table 4.2 gives estimates for households.

## A. Population Net Undercoverage

*Population net undercoverage was higher in the West.*
Among the 10 provinces, population net undercoverage rates were highest in British Columbia (3.68%), followed by Saskatchewan (2.75%) and Ontario (2.73%). Overall, the highest rates were found in the two territories, with the Northwest Territories having a net undercoverage rate of 4.48%. Prince Edward Island, at 0.85%, and Quebec, at 1.61%, had the lowest rates.

*Population net undercoverage increased with population size.*
Overall, population net undercoverage was slightly higher in urban areas (2.48%) than in rural areas (2.32%). Among urban areas of different sizes, rates varied between 1.53% (less than 10,000) and 3.21% (500,000 and over). Whereas the rates of net undercoverage for the 10,000 to 29,999 and 30,000 to 99,999 categories were almost the same, 2.05% and 2.03% respectively, the rates were higher for the 100,000 to 499,999 (2.80%) and 500,000 and over (3.21%) in urban areas.

*Population net undercoverage was higher in the urban core.*
The population net undercoverage rate for the population living in census metropolitan areas was close to the national rate. However, the rates varied across the urban core (2.67%), urban fringe (1.26%), and rural fringe (1.88%) components. Among specific CMAs, Vancouver and Toronto had the highest net undercoverage rates, 3.93% and 3.39% respectively.

*Population net undercoverage was highest for young adults aged 20 to 35.*
The high population net undercoverage rate for young adults aged 20 to 35 reflects higher residence mobility in this age group. The net undercoverage rate for persons aged 20 to 24 was 5.55% and the rate was only slightly lower for those aged 25 to 34. Net undercoverage was much higher than the national rate for these age groups for both men and women. Males aged 20 to 34 had the highest net undercoverage rate, 7.14% for those 20 to 24 and 7.08% for the 25 to 34 age group. Overall, net undercoverage was higher for men (3.19%) than for women (1.71%). The higher rate for men held for all age groups beyond age 15.

*Population net undercoverage was highest for never-married persons 15 years of age and older and divorced persons.*
The overall difference of 1.48 percentage points between males and females was largely explained by never-married persons 15 years of age and older and divorced persons. For never-married males 15 years of age or over, the net undercoverage rate was 6.40%, compared to 3.00% for females in the same group. For divorced males, the rate was 6.88%, compared to 2.40% for divorced females. Using historical marital status, which differs from legal marital status in that common-law unions are included in the married category, the highest rates of net undercoverage occurred among divorced (5.29%) and never-married persons 15 years of age or over (5.10%).

*Population net undercoverage was slightly higher for persons living common-law.*
The net undercoverage for males living common-law was 3.91%, compared to 3.19% for all males. For females living common-law, the net undercoverage rate was 2.45%, compared to 1.71% for all females.

*Population net undercoverage was highest for "Other than French or English."*
There were differences in the rates of net undercoverage between those reporting English as a mother tongue (2.18%) and those reporting French (1.67%). Among those reporting a non-official language as their mother tongue, however, the rate was substantially higher (5.17%).

## B. Household Net Undercoverage

*Household net undercoverage increased from east to west.*
British Columbia had the highest household net undercoverage rate (3.36%) of the ten provinces followed by Nova Scotia (2.31%), although the latter did not differ much from the national rate. Manitoba had the lowest estimated rate at 0.81%. Overall, the territories had the highest household net undercoverage rate.

*Household net undercoverage increased with population.*
The rates of net undercoverage for households did not differ much between urban and rural areas. In addition, net undercoverage did not vary notably by urban area size, with the exception of the category of less than 10,000 where net undercoverage was lower. (Note that incompletely enumerated Indian reserves were excluded from the estimates.)

*Household net undercoverage was higher in CMAs than in non-CMAs.*
The household net undercoverage rate in urban core areas of CMAs was higher than in urban fringe areas, although the difference was not large. Among specific CMAs, Vancouver and Toronto had the highest rates, 3.73% and 3.35% respectively.

*Household net undercoverage rates were highest among duplexes and mobile homes.*
The household net undercoverage rates for single-detached and semi-detached houses differed from the national rate. All categories except "other single-attached house" had undercoverage rates that were notably smaller than the rates for mobile homes and duplexes. Single-detached houses, although they had a lower-than-average net undercoverage rate, accounted for 36% of the total net undercoverage.

**Table 4.1  Estimated 1996 Census Population Net Undercoverage**

| Characteristics | Net number of persons missed | | Population net undercoverage rate | |
|---|---|---|---|---|
| | Estimated number | Standard error | Estimated rate (%) | Standard error (%) |
| **Canada** | 723,486 | 29,674 | 2.45 | 0.10 |
| Newfoundland | 9,424 | 1,759 | 1.68 | 0.31 |
| Prince Edward Island | 1,149 | 437 | 0.85 | 0.32 |
| Nova Scotia | 20,821 | 2,580 | 2.24 | 0.27 |
| New Brunswick | 14,225 | 2,354 | 1.89 | 0.31 |
| Quebec | 116,750 | 14,963 | 1.61 | 0.20 |
| Ontario | 301,368 | 21,265 | 2.73 | 0.19 |
| Manitoba | 18,881 | 3,875 | 1.67 | 0.34 |
| Saskatchewan | 28,051 | 3,521 | 2.75 | 0.34 |
| Alberta | 66,327 | 7,555 | 2.40 | 0.27 |
| British Columbia | 142,443 | 9,967 | 3.68 | 0.25 |
| Yukon | 1,022 | 167 | 3.22 | 0.51 |
| Northwest Territories | 3,024 | 357 | 4.48 | 0.51 |
| Nunavut | 841 | 180 | 3.29 | 0.68 |
| Northwest Territories – west | 2,184 | 309 | 5.22 | 0.70 |

**Table 4.1 Estimated 1996 Census Population Net Undercoverage** – Continued

| Characteristics | Net number of persons missed | | Population net undercoverage rate | |
| --- | --- | --- | --- | --- |
| | Estimated number | Standard error | Estimated rate (%) | Standard error (%) |
| **Urban and Rural Areas** | **723,486** | **29,674** | **2.45** | **0.10** |
| Urban areas (by size of population) | 572,128 | 26,701 | 2.48 | 0.11 |
| 500,000 and over | 194,219 | 16,933 | 3.21 | 0.27 |
| 100,000 – 499,999 | 167,669 | 14,450 | 2.80 | 0.23 |
| 30,000 – 99,999 | 106,342 | 11,805 | 2.03 | 0.22 |
| 10,000 – 29,999 | 63,339 | 8,714 | 2.05 | 0.28 |
| Less than 10,000 | 40,557 | 7,672 | 1.53 | 0.29 |
| Rural areas | 151,358 | 12,596 | 2.32 | 0.19 |
| **All CMAs** | **474,900** | **24,609** | **2.59** | **0.13** |
| Urban core | 447,556 | 24,205 | 2.67 | 0.14 |
| Urban fringe | 5,181 | 2,574 | 1.26 | 0.62 |
| Rural fringe | 22,163 | 5,299 | 1.88 | 0.44 |
| **Non CMAs** | **248,585** | **16,597** | **2.21** | **0.14** |
| **Selected CMAs** | | | | |
| Montréal | 59,779 | 9,833 | 1.77 | 0.29 |
| Toronto | 149,810 | 17,828 | 3.39 | 0.39 |
| Vancouver | 75,016 | 7,427 | 3.93 | 0.37 |
| Ottawa | 19,472 | 4,989 | 1.89 | 0.48 |
| All others | 170,822 | 14,914 | 2.25 | 0.19 |
| **Age and Sex** | | | | |
| **Both Sexes** | **723,486** | **29,674** | **2.45** | **0.10** |
| 0 – 4 years | 44,849 | 7,552 | 2.29 | 0.38 |
| 5 – 14 years | 19,898 | 6,232 | 0.50 | 0.15 |
| 15 – 19 years | 44,943 | 9,907 | 2.24 | 0.48 |
| 20 – 24 years | 111,598 | 9,174 | 5.55 | 0.43 |
| 25 – 34 years | 244,389 | 15,363 | 5.15 | 0.31 |
| 35 – 44 years | 119,684 | 12,696 | 2.40 | 0.25 |
| 45 – 54 years | 53,354 | 9,255 | 1.42 | 0.24 |
| 55 – 64 years | 43,372 | 8,662 | 1.71 | 0.34 |
| 65 years and over | 41,398 | 9,842 | 1.16 | 0.27 |

**Table 4.1  Estimated 1996 Census Population Net Undercoverage** – Continued

| Characteristics | Net number of persons missed | | Population net undercoverage rate | |
| --- | --- | --- | --- | --- |
| | Estimated number | Standard error | Estimated rate (%) | Standard error (%) |
| **Males** | **467,428** | **21,394** | **3.19** | **0.14** |
| 0 – 4 years | 20,419 | 4,948 | 2.04 | 0.48 |
| 5 – 14 years | 9,586 | 6,088 | 0.47 | 0.30 |
| 15 – 19 years | 26,318 | 4,947 | 2.56 | 0.47 |
| 20 – 24 years | 73,234 | 6,922 | 7.14 | 0.63 |
| 25 – 34 years | 169,787 | 10,161 | 7.08 | 0.39 |
| 35 – 44 years | 88,617 | 10,226 | 3.56 | 0.40 |
| 45 – 54 years | 33,139 | 5,356 | 1.76 | 0.28 |
| 55 – 64 years | 26,577 | 7,076 | 2.12 | 0.55 |
| 65 years and over | 19,752 | 6,977 | 1.31 | 0.46 |
| **Females** | **256,059** | **20,954** | **1.71** | **0.14** |
| 0 – 4 years | 24,433 | 5,774 | 2.55 | 0.59 |
| 5 – 14 years | 10,312 | 4,807 | 0.53 | 0.25 |
| 15 – 19 years | 18,626 | 7,108 | 1.91 | 0.72 |
| 20 – 24 years | 38,364 | 6,072 | 3.90 | 0.59 |
| 25 – 34 years | 74,600 | 11,332 | 3.18 | 0.47 |
| 35 – 44 years | 31,065 | 7,621 | 1.25 | 0.30 |
| 45 – 54 years | 20,215 | 7,689 | 1.07 | 0.40 |
| 55 – 64 years | 16,797 | 5,011 | 1.31 | 0.39 |
| 65 years and over | 21,645 | 7,195 | 1.05 | 0.35 |
| **Legal Marital Status and Sex** | | | | |
| **Both Sexes** | **723,486** | **29,674** | **2.45** | **0.10** |
| Married or separated | 174,236 | 17,188 | 1.38 | 0.13 |
| Divorced | 76,234 | 7,985 | 4.42 | 0.44 |
| Widowed | 31,264 | 7,265 | 2.07 | 0.47 |
| Never married | 441,753 | 21,513 | 3.22 | 0.15 |
| Less than 15 years | 64,800 | 9,857 | 1.09 | 0.16 |
| 15 years and over | 376,953 | 19,127 | 4.86 | 0.23 |
| **Males** | **467,428** | **21,394** | **3.19** | **0.14** |
| Married or separated | 103,643 | 12,551 | 1.65 | 0.20 |
| Divorced | 53,526 | 6,523 | 6.88 | 0.78 |
| Widowed | 8,609 | 3,492 | 3.18 | 1.25 |
| Never married | 301,649 | 15,417 | 4.13 | 0.20 |
| Less than 15 years | 30,034 | 7,815 | 0.98 | 0.25 |
| 15 years and over | 271,616 | 13,480 | 6.40 | 0.30 |

**Table 4.1  Estimated 1996 Census Population Net Undercoverage** – Continued

| Characteristics | Net number of persons missed | | Population net undercoverage rate | |
|---|---|---|---|---|
| | Estimated number | Standard error | Estimated rate (%) | Standard error (%) |
| **Females** | **256,059** | **20,954** | **1.71** | **0.14** |
| Married or separated | 70,594 | 11,853 | 1.12 | 0.19 |
| Divorced | 22,708 | 5,074 | 2.40 | 0.52 |
| Widowed | 22,655 | 6,276 | 1.83 | 0.50 |
| Never married | 140,102 | 14,713 | 2.18 | 0.22 |
| Less than 15 years | 34,766 | 7,097 | 1.19 | 0.24 |
| 15 years and over | 105,337 | 12,655 | 3.00 | 0.35 |
| **Historical Marital Status and Sex** | | | | |
| **Both Sexes** | **723,486** | **29,674** | **2.45** | **0.10** |
| Married or separated | 228,511 | 17,737 | 1.59 | 0.12 |
| Divorced | 65,480 | 7,493 | 5.29 | 0.57 |
| Widowed | 31,594 | 7,265 | 2.17 | 0.49 |
| Never married | 397,904 | 21,398 | 3.18 | 0.17 |
| Less than 15 years | 64,828 | 9,857 | 1.09 | 0.16 |
| 15 years and over | 333,075 | 19,144 | 5.10 | 0.28 |
| **Males** | **467,428** | **21,394** | **3.19** | **0.14** |
| Married or separated | 137,760 | 12,752 | 1.92 | 0.17 |
| Divorced | 46,811 | 6,438 | 8.89 | 1.11 |
| Widowed | 8,712 | 3,492 | 3.49 | 1.35 |
| Never married | 274,145 | 15,380 | 4.10 | 0.22 |
| Less than 15 years | 30,034 | 7,815 | 0.98 | 0.25 |
| 15 years and over | 244,111 | 13,600 | 6.73 | 0.35 |
| **Females** | **256,059** | **20,954** | **1.71** | **0.14** |
| Married or separated | 90,751 | 12,226 | 1.26 | 0.17 |
| Divorced | 18,667 | 4,236 | 2.63 | 0.58 |
| Widowed | 22,882 | 6,276 | 1.90 | 0.51 |
| Never married | 123,759 | 14,669 | 2.13 | 0.25 |
| Less than 15 years | 34,794 | 7,096 | 1.20 | 0.24 |
| 15 years and over | 88,964 | 12,588 | 3.07 | 0.42 |

**Table 4.1  Estimated 1996 Census Population Net Undercoverage** – Concluded

| Characteristics | Net number of persons missed | | Population net undercoverage rate | |
| --- | --- | --- | --- | --- |
| | Estimated number | Standard error | Estimated rate (%) | Standard error (%) |
| **Common Law and Sex** (persons in common-law unions) | | | | |
| **Both Sexes** | **60,234** | **7,042** | **3.19** | **0.36** |
| Males | 37,249 | 4,893 | 3.91 | 0.49 |
| Females | 22,983 | 5,007 | 2.45 | 0.52 |
| **Mother Tongue** | **723,486** | **29,674** | **2.45** | **0.10** |
| English | 382,064 | 20,687 | 2.18 | 0.12 |
| French | 112,196 | 13,366 | 1.67 | 0.20 |
| Other than English or French | 228,049 | 15,723 | 5.17 | 0.34 |
| English and French | -619 | 2,070 | -0.27 | 0.91 |
| English and Other | 3,743 | 2,423 | 0.64 | 0.41 |
| French and Other | -1,861 | 922 | -2.08 | 1.05 |
| English, French and Other | -83 | 3 | -0.18 | 0.01 |

### Table 4.2  Estimated 1996 Census Household Net Undercoverage

| Characteristics | Net number of households missed | | Household net undercoverage rate | |
|---|---|---|---|---|
| | Estimated number | Standard error | Estimated rate (%) | Standard error (%) |
| **Canada** | **242,647** | **14,375** | **2.19** | **0.13** |
| Newfoundland | 2,210 | 687 | 1.18 | 0.36 |
| Prince Edward Island | 541 | 198 | 1.12 | 0.40 |
| Nova Scotia | 8,107 | 1,524 | 2.31 | 0.42 |
| New Brunswick | 5,115 | 1,468 | 1.85 | 0.52 |
| Quebec | 56,448 | 6,466 | 1.96 | 0.22 |
| Ontario | 92,442 | 10,438 | 2.30 | 0.25 |
| Manitoba | 3,421 | 1,739 | 0.81 | 0.41 |
| Saskatchewan | 5,450 | 1,397 | 1.44 | 0.36 |
| Alberta | 18,065 | 3,018 | 1.81 | 0.30 |
| British Columbia | 49,543 | 5,412 | 3.36 | 0.35 |
| Yukon | 394 | 80 | 3.32 | 0.65 |
| Northwest Territories | 910 | 139 | 4.61 | 0.67 |
| Nunavut | 213 | 68 | 3.31 | 1.03 |
| Northwest Territories – west | 696 | 120 | 5.23 | 0.86 |
| **Urban and Rural Areas** | **242,647** | **14,375** | **2.19** | **0.13** |
| Urban areas (by size of population) | 194,704 | 12,661 | 2.21 | 0.14 |
| 500,000 and over | 68,209 | 7,971 | 2.87 | 0.33 |
| 100,000 – 499,999 | 54,834 | 7,512 | 2.45 | 0.33 |
| 30,000 – 99,999 | 33,417 | 5,252 | 1.66 | 0.26 |
| 10,000 – 29,999 | 23,893 | 3,961 | 2.05 | 0.33 |
| Less than 10,000 | 14,351 | 3,155 | 1.43 | 0.31 |
| Rural areas | 47,943 | 5,686 | 2.12 | 0.25 |
| **All CMAs** | **161,948** | **11,792** | **2.34** | **0.17** |
| Urban core | 152,299 | 11,404 | 2.39 | 0.17 |
| Urban fringe | 1,935 | 1,251 | 1.34 | 0.85 |
| Rural fringe | 7,714 | 2,960 | 1.96 | 0.74 |
| **Non CMAs** | **80,699** | **7,516** | **1.95** | **0.18** |
| **Selected CMAs** | | | | |
| Montréal | 24,764 | 3,855 | 1.81 | 0.28 |
| Toronto | 51,556 | 8,162 | 3.35 | 0.51 |
| Vancouver | 26,840 | 3,780 | 3.73 | 0.51 |
| Ottawa | 7,161 | 2,604 | 1.83 | 0.65 |
| All others | 51,627 | 7,274 | 1.78 | 0.25 |

**Table 4.2 Estimated 1996 Census Household Net Undercoverage** – Concluded

| Characteristics | Net number of households missed | | Household net undercoverage rate | |
|---|---|---|---|---|
| | Estimated number | Standard error | Estimated rate (%) | Standard error (%) |
| **Type of Private Dwelling** | **242,647** | **14,375** | **2.19** | **0.13** |
| Single-detached house | 95,568 | 8,765 | 1.54 | 0.14 |
| Semi-detached house | 6,097 | 2,013 | 1.20 | 0.39 |
| Row house | 9,613 | 3,102 | 1.75 | 0.56 |
| Apartment in a building that has fewer than five storeys | 53,782 | 7,487 | 2.58 | 0.35 |
| Apartment in a building that has five or more storeys | 22,396 | 4,870 | 2.24 | 0.48 |
| Mobile home | 13,550 | 2,588 | 7.79 | 1.37 |
| Other single-attached house | 966 | 879 | 2.38 | 2.12 |
| Duplex | 40,675 | 5,421 | 8.26 | 1.01 |

# V. Coverage Error Measurement Program

## A. Scope and Objectives

The Coverage Error Measurement Program focuses on the population universe, the dwelling universe, and the household universe. The following components of coverage error are measured:

- undercoverage and overcoverage of the population;
- undercoverage and overcoverage of households; and
- classification errors involving unoccupied private dwellings.

The 1996 Coverage Error Measurement Program consisted of four studies:

- Vacancy Check
- Reverse Record Check
- Automated Match Study
- Collective Dwelling Study

The Vacancy Check (VC) produced estimates of undercoverage arising from the incorrect classification of dwellings as unoccupied. The Reverse Record Check (RRC) was designed to measure undercoverage from all sources, including the undercoverage measured by the VC. Overcoverage was measured by the RRC, the Automated Match Study (AMS), and the Collective Dwelling Study (CDS). The AMS focused on persons counted more than once within the same region (Atlantic, Quebec, Ontario, rest of Canada) while the CDS estimated overcoverage resulting from persons enumerated as usual residents in a collective dwelling who were also enumerated at a private dwelling. Although the RRC is designed to measure overcoverage from all sources, only the overcoverage not measured by either the AMS or the CDS contributed to the estimates of coverage error.

| 1996 Census Coverage Error Measurement Program | | |
| --- | --- | --- |
| **Study** | **Sample Size** | **Objective** |
| Vacancy Check | 1,396 enumeration areas | Measures undercoverage from occupied dwellings misclassified as vacant. |
| Reverse Record Check | 57,016 persons | Measures undercoverage from all sources and overcoverage not included in the Automated Match Study or the Collective Dwelling Study. |
| Automated Match Study | 7,688 pairs of households | Measures overcoverage from persons enumerated in two households in the same region. |
| Collective Dwelling Study | 12,561 persons | Measures overcoverage from persons enumerated in a collective dwelling and a private dwelling. |

The data resulting from these four studies were used in the following ways:

- Estimates from the Vacancy Check were included in the final census counts to account for this specific source of undercoverage.

- Estimates from the Reverse Record Check, the Automated Match Study, and the Collective Dwelling Study were only included in the base population for the Population Estimates Program of Statistics Canada.

- Information on the causes and characteristics of coverage errors is used in the planning of the next census to identify areas or sub-groups of the population where the level of coverage error is particularly high.

- Supplementary information collected by the studies was used to evaluate the quality of selected census questions. The Reverse Record Check, for example, provides the means of linking an individual's answers over two consecutive censuses thereby enabling the calculation of response error for questions such as date o birth, sex, and mother tongue.

- The results serve to inform users about the nature and levels of coverage errors in the census so that they are better informed when drawing conclusions or making decisions based on census data.

The methodology and results of each of the coverage measurement studies are presented in the following chapters.

## B. Improvements

The following changes were made to the 1991 coverage studies to obtain a better measure of coverage error from the 199 coverage studies:

- The Temporary Residents Study was cancelled. This study focused on undercoverage resulting from the failure to enumerate persons who were away from their usual place of residence on Census Day. Besides concerns about the quality of the data from the Temporary Residents Study, it was recognized that the Reverse Record Check could estimate this type of undercoverage with sufficient quality.

- Undercoverage of incompletely enumerated Indian reserves is no longer measured, due to the increasing difficulty of selecting a representative sample in the Reverse Record Check.

- A more comprehensive measure of overcoverage was produced due to two changes. Firstly, the Private Dwelling Study was integrated into the Reverse Record Check, so each Selected Person was classified either as enumerated once, enumerated more than once, missed, or not enumerable. This change also resulted in an increase of addresses where overcoverage could have occurred. Secondly, the Automated Match Study was substantially expanded from the 1991 approach of measuring overcoverage within an enumeration area to measuring overcoverage within a large region (Atlantic, Quebec, Ontario, rest of Canada).

- Improvements to the Reverse Record Check included a more efficient one-stage design, a more extensive follow-up of persons potentially missed, and a redesign of processing operations.

# VI. Vacancy Check

## A. Introduction

One of the potential sources of error in the census is the misclassification of dwellings. The erroneous inclusion of marginal dwellings or dwellings under construction in the unoccupied dwellings classification results in overcoverage of the housing stock, whereas the incorrect classification of occupied dwellings as unoccupied results in undercoverage of both households and persons. The purpose of the Vacancy Check is to study these two types of classification error.

The uses of the information collected by the Vacancy Check are as follows:

- to estimate the number of unoccupied dwellings that were outside the housing universe;
- to estimate the number of occupied dwellings that were misclassified as unoccupied during the census;
- to estimate the number of households and persons missed as a result of this misclassification; and
- **to adjust the census data for households and persons to correct this misclassification.**

## B. Methodology

### 1. Stratification and Sample Selection

The population targeted by the Vacancy Check was all unoccupied dwellings identified in the Census as of May 14, 1996 excluding unoccupied dwellings in collective enumeration areas (EAs), canvasser EAs and in Indian reserves. These areas were excluded from the sampling frame mainly because of cost and operational considerations.

The sample size for the 1996 Vacancy Check was set at 1,396 EAs across Canada. The sampling frame included all mail-back EAs with the exception of Indian reserves.

The initial screening for the sample selection was done to select only EAs which had a mail-back method of collection and which were not linked to Indian reserves, Indian settlements, or other types of Indian census subdivisions (CSDs). The EAs were then split into separate urban and rural frames for sample selection. In order to be included in the urban frame an EA must initially have been part of a census agglomeration (CA) or census metropolitan area (CMA) that had 40,000 or more occupied dwellings. If more than 50% of the EAs in a census commissioner district (CCD) located within the selected CA/CMAs were linked to urban areas, then all EAs within that CCD were considered to be urban. Otherwise all EAs within that CCD were considered to be rural. All EAs that did not fall into the urban definition became part of the rural frame. The Vacancy Check sample was then selected from these two frames.

### Urban Sample

The urban sample had three separate components. In the Yukon and Northwest Territories all EAs in the frame were selected for the Vacancy Check. In Prince Edward Island, a simple random sample of 48 EAs was selected. The urban sample for all other provinces was selected by stratifying the urban EAs by CA/CMA within each province, i.e. each CA/CMA was considered a stratum, and a simple random sample of the required number of EAs was then selected from each stratum. This gave a total of 725 urban EAs in the sample.

### Rural Sample

The rural sample was selected with the use of two-stage sampling. Interviewer field costs, especially travel costs, can rise substantially outside urban areas. Based on 1986 and 1991 data, 5 EAs grouped together were determined to be an

appropriate workload for a Vacancy Check interviewer. In order to group 5 EAs close enough together to form a relatively tight unit, two-stage sampling was used. In the first stage, the allocated number of CCDs was randomly selected for each province. In the second stage, five EAs were randomly selected from each of the selected CCDs. These sampling procedures produced the 671 EAs in the rural sample.

The Vacancy Check sample consisted of all unoccupied dwellings in the sampled EAs. A total of 21,252 dwellings were selected to be part of the Vacancy Check sample. Table 6.1 shows the sample distribution by province and territory.

A Centralized Edit Test was conducted as part of the 1996 Census. It took place in Eastern Ontario, and the Vacancy Check EAs which were part of this test required slightly different head office processing than the rest of the Vacancy Check sample. The sample in Ontario in 1996 is slightly larger than the sample in 1991 to take into account the centralized edit EAs. In order to keep the sample size at approximately 1,400 EAs, the sample in Quebec is slightly smaller than in 1991.

## 2. Field Interviews

All dwellings classified as unoccupied on Census Day in the sampled EAs were to be checked again in late June or early July 1996, to determine the true occupancy status of the dwellings on Census Day.

The timing of this operation after census enumeration was left to the discretion of each regional office. In Eastern Ontario where centralized edit procedures were being tested, the Vacancy Check could not be completed until late August (rural areas) or early September (urban areas). To determine occupancy status, interviewers were instructed to contact current occupants, neighbours, landlords, or any other person with some knowledge about the dwelling. Up to three contact attempts were made for each dwelling. If the dwelling was found to have been occupied on Census Day, the number and names of occupants of the dwelling on Census Day were also obtained.

## 3. Processing, Coding, and Editing

All questionnaires were sent to Ottawa for processing after interviews were completed. Once in head office, the questionnaires went through preliminary processing and were then captured.

First, any questionnaires not belonging to the sample were eliminated, and in cases where more than one questionnaire was completed for an address, the correct questionnaire for each dwelling was obtained. Some preliminary edits and general grooming of the questionnaires were then carried out before the questionnaires were sent for capture.

Once data capture was completed, the questionnaires were subjected to an extensive set of consistency edits. The questionnaires failing edits were examined individually in order to resolve the inconsistencies.

For each dwelling found to have been occupied on Census Day, the Visitation Record (VR) was checked. If the dwelling was listed as both an unoccupied dwelling and an occupied dwelling, it was assumed that the occupied dwelling enumeration was correct. That is, the dwelling and its occupants had been correctly enumerated in the census. The dwelling was placed in the "not in housing stock" category, since it should not have been listed as an unoccupied dwelling.

The remaining questionnaires completed for each EA were then checked against the listings of unoccupied dwellings in the VR. Dwellings for which a questionnaire was received but no listing was found in the VR were removed from the study. Dwellings which were listed in the VR, but for which no Vacancy Check questionnaire was received, were considered to be non-response.

## 4. Non-response, Imputation, and Weighting

Total non-response (i.e. no information for a particular dwelling) was addressed with an adjustment to the weights within each of several subprovincial areas. These subprovincial areas consisted of the three largest CMAs (Montréal, Toronto and Vancouver) along with the remaining urban and rural parts of each province and territory.

Item non-response for occupancy status, number of usual residents, and dwelling type was addressed by imputation. Occupancy status was imputed first and then used in the imputation of the other variables.

The weights were then adjusted so that their sum would give the known number of unoccupied dwellings found in the census for each subprovincial area.

The final step of the Vacancy Check processing was the actual adjustment of the census databases. This was accomplished by first producing a national level profile of misclassified dwellings for both urban and rural areas, using the type of dwelling and the number of persons missed because of the misclassification. These national profiles were then used to create estimates of the number of misclassified dwellings by number of persons in the household, type of dwelling, and rural/urban parts at the province and territory level. On the basis of these estimates, enumerated households with the same characteristics (number of persons, type of private dwelling) were selected at random, and their weights in the census were increased by one unit. For each household selected, the weight of one unoccupied dwelling from the same EA was set to zero so that the total number of dwellings would not be increased.

## C. Results

The main results are shown in Tables 6.2, 6.3, 6.4 and 6.5. Table 6.2 gives the estimated number and rate of dwellings misclassified as unoccupied by urban/rural area, by region, by province, and by type of dwelling. Table 6.3 shows the number of households and persons added to the 1996 Census counts because of these misclassifications. Table 6.4 shows the number of unoccupied dwellings not in the housing stock, using the same breakdown of areas as the one given in Table 6.2. Table 6.5 shows the undercoverage rates for households and persons and the overcoverage rates for dwellings.

### 1. Occupied Dwellings

Table 6.2 shows that 7.8% of dwellings that were classified as unoccupied during the census were actually occupied. These also include dwellings that were occupied by foreign or temporary residents only as well as dwellings for which one or more persons were enumerated elsewhere in Canada. This number is down from the value of 10.1% found in 1991. This misclassification of dwellings was more prevalent in urban areas (9.9%) than in rural areas (5.5%).

At the province level, Yukon had the highest rate of misclassification at 19.7%. This was followed by Ontario, British Columbia, and Alberta at 10.1%, 9.7%, and 7.9% respectively. The rates for the other provinces were fairly consistent, ranging from 4.3% in Newfoundland to 6.1% in Quebec.

Among the three largest CMAs, the rate of misclassification in Toronto (21.6%) is much higher than in either Montréal (7.2%) or Vancouver (12.6%).

Among the types of dwellings classified in the census, the rate of misclassification is lowest in single-detached houses (7.6%) and highest in apartments in buildings of five or more storeys (12.1%). The rate of misclassification in the "Other" category, which includes semi-detached houses, row houses, duplexes, apartments in buildings with fewer than five storeys, mobile homes and other movable dwellings, is 10.6%.

Owing to this classification error, a number of households and persons were not enumerated in the 1996 Census. However, some of the 61,287 dwellings misclassified as unoccupied had actually also been correctly enumerated by the CR as occupied dwellings in that they were listed twice in the VR, and some were occupied by temporary or foreign residents who should, correctly, not have been included in the census counts. Therefore, the actual number of underenumerated households was estimated at 46,553, and this is the number of households that were added to the census counts via the Vacancy Check Study. Table 6.3 shows the actual number of households and persons that were added to the census counts. Table 6.5 shows that the undercoverage of households due to this classification error was 0.42%, which represents these 46,553 households. Undercoverage of persons is 0.30% or 87,753 persons.

## 2. Dwellings Not in the Housing Stock

The enumeration of unoccupied dwellings which fall outside the housing universe results in overcoverage of dwellings. Dwellings are considered to be outside the housing universe if they are used for commercial purposes, if they are not habitable year round, and if they are double counted in the census—that is, if they are listed in the VR as occupied as well as unoccupied.

In order for a dwelling to be considered suitable for year-round occupancy, it must have shelter from the elements, a source of water, and a source of heat. It is sometimes difficult to tell whether a dwelling is in fact habitable such as in the case of cottages, a dwelling under construction that is almost complete, or a dwelling that has deteriorated. The question of suitability can therefore have a degree of subjectivity, so that different census representatives may classify a dwelling differently. For this reason **the estimates of unoccupied dwellings identified in the Vacancy Check as not part of the housing stock, given in Table 6.4, should be used with caution.**

Overall, dwellings outside the housing stock account for 15.2% of all dwellings classified as unoccupied in the census. The problem is slightly more pronounced in rural areas (17.5%) than in urban areas (13.2%). At the province level, the incidence of dwellings outside the housing stock having been classified as unoccupied ranges from 7.5% in the Northwest Territories to 40.8% in Prince Edward Island.

Finally, Table 6.5 shows that dwelling overcoverage is estimated at 1.09% of all dwellings. At the province/territory level overcoverage ranges from 0.29% in the Northwest Territories to 2.77% in Saskatchewan.

**Table 6.1  Sample Size by Province/Territory, 1996 Vacancy Check**

| Province/territory | Number of EAs in sample | Number of unoccupied dwellings in sample |
|---|---|---|
| Canada | 1,396 | 21,252 |
| Newfoundland | 82 | 1,758 |
| Prince Edward Island | 48 | 706 |
| Nova Scotia | 90 | 1,531 |
| New Brunswick | 71 | 937 |
| Quebec | 250 | 4,564 |
| Ontario | 256 | 2,766 |
| Manitoba | 90 | 1,545 |
| Saskatchewan | 137 | 2,166 |
| Alberta | 133 | 1,538 |
| British Columbia | 149 | 2,382 |
| Yukon | 47 | 646 |
| Northwest Territories | 43 | 713 |

**Table 6.2  Estimated Number of Occupied Dwellings Misclassified as Unoccupied, 1996 Vacancy Check**

| Characteristics | Number of dwellings initially classified as unoccupied | Occupied Dwellings | | | |
|---|---|---|---|---|---|
| | | Estimated total | Standard error | Rate (%) | Standard error (%) |
| **Canada** | **781,594** | **61,287** | **3,296** | **7.8** | **0.4** |
| Urban | 415,474 | 41,295 | 2,570 | 9.9 | 0.6 |
| Rural | 366,120 | 19,992 | 2,021 | 5.5 | 0.6 |
| Atlantic | 67,671 | 3,303 | 488 | 4.9 | 0.7 |
| Newfoundland | 23,081 | 1,001 | 303 | 4.3 | 1.3 |
| Prince Edward Island | 3,109 | 176 | 40 | 5.7 | 1.3 |
| Nova Scotia | 25,842 | 1,305 | 291 | 5.1 | 1.1 |
| New Brunswick | 15,639 | 822 | 246 | 5.3 | 1.6 |
| Quebec | 216,838 | 13,298 | 1,502 | 6.1 | 0.7 |
| Ontario | 262,721 | 26,611 | 2,457 | 10.1 | 0.9 |
| Prairies | 142,773 | 9,187 | 849 | 6.4 | 0.6 |
| Manitoba | 32,598 | 1,900 | 326 | 5.8 | 1.0 |
| Saskatchewan | 40,276 | 1,757 | 341 | 4.4 | 0.8 |
| Alberta | 69,899 | 5,530 | 706 | 7.9 | 1.0 |
| British Columbia | 90,112 | 8,714 | 1,269 | 9.7 | 1.4 |
| Territories | 1,479 | 173 | 32 | 11.7 | 2.2 |
| Yukon | 748 | 147 | 30 | 19.7 | 4.0 |
| Northwest Territories | 731 | 26 | 10 | 3.6 | 1.4 |
| **Selected CMAs** | | | | | |
| Montréal | 70,552 | 5,093 | 858 | 7.2 | 1.2 |
| Toronto | 38,210 | 8,259 | 1,588 | 21.6 | 4.2 |
| Vancouver | 29,711 | 3,737 | 765 | 12.6 | 2.6 |
| **Type of Private Dwelling** | | | | | |
| Single-detached | 329,517 | 24,987 | 2,172 | 7.6 | 0.7 |
| Apartment in a building with five or more storeys | 62,829 | 7,593 | 1,584 | 12.1 | 2.5 |
| Other | 272,067 | 28,707 | 2,102 | 10.6 | 0.8 |

**Table 6.3 Number of Households and Persons Added by the 1996 Vacancy Check**

| Characteristics | Number of dwellings initially classified as unoccupied | Households added | | Persons added | |
|---|---|---|---|---|---|
| | | Total | Standard error | Total | Standard error |
| **Canada** | **781,594** | **46,553** | **2,813** | **87,753** | **5,528** |
| Urban | 415,474 | 33,256 | 2,299 | 61,768 | 4,116 |
| Rural | 366,120 | 13,298 | 1,608 | 25,985 | 3,646 |
| Atlantic | 67,671 | 2,300 | 357 | 4,095 | 621 |
| Newfoundland | 23,081 | 564 | 166 | 1,102 | 328 |
| Prince Edward Island | 3,109 | 114 | 33 | 238 | 71 |
| Nova Scotia | 25,842 | 1,089 | 253 | 1,826 | 392 |
| New Brunswick | 15,639 | 532 | 187 | 930 | 346 |
| Quebec | 216,838 | 9,691 | 1,156 | 17,283 | 2,036 |
| Ontario | 262,721 | 20,734 | 2,259 | 39,542 | 4,503 |
| Prairies | 142,773 | 6,638 | 605 | 12,693 | 1,315 |
| Manitoba | 32,598 | 1,517 | 274 | 2,470 | 415 |
| Saskatchewan | 40,276 | 1,030 | 209 | 1,631 | 303 |
| Alberta | 69,899 | 4,091 | 497 | 8,591 | 1,210 |
| British Columbia | 90,112 | 7,057 | 989 | 13,897 | 2,006 |
| Territories | 1,479 | 132 | 28 | 244 | 47 |
| Yukon | 748 | 16 | 27 | 205 | 44 |
| Northwest Territories | 731 | 6 | 7 | 39 | 17 |
| **Selected CMAs** | | | | | |
| Montréal | 70,552 | 3,898 | 710 | 6,024 | 1,049 |
| Toronto | 38,210 | 6,827 | 1,469 | 13,324 | 2,888 |
| Vancouver | 29,711 | 3,306 | 727 | 6,965 | 1,522 |
| **Type of Private Dwelling** | | | | | |
| Single-detached | 329,517 | 17,430 | 1,625 | 37,889 | 4,000 |
| Apartment in a building with five or more storeys | 62,829 | 6,178 | 1,468 | 10,031 | 2,639 |
| Other | 272,067 | 22,946 | 1,843 | 39,833 | 3,370 |

**Table 6.4  Estimated Number of Unoccupied Dwellings Not in Housing Stock, 1996 Vacancy Check**

| Characteristics | Number of dwellings initially classified as unoccupied | Not in housing stock | | | |
|---|---|---|---|---|---|
| | | Estimated total | Standard error | Rate (%) | Standard error (%) |
| **Canada** | **781,594** | **118,748** | **13,990** | **15.2** | **1.8** |
| Urban | 415,474 | 54,764 | 4,862 | 13.2 | 1.2 |
| Rural | 366,120 | 63,984 | 13,081 | 17.5 | 3.6 |
| Atlantic | 67,671 | 10,984 | 1,187 | 16.2 | 1.8 |
| Newfoundland | 23,081 | 4,243 | 925 | 18.4 | 4.0 |
| Prince Edward Island | 3,109 | 1,268 | 229 | 40.8 | 7.4 |
| Nova Scotia | 25,842 | 2,862 | 621 | 11.1 | 2.4 |
| New Brunswick | 15,639 | 2,611 | 339 | 16.7 | 2.2 |
| Quebec | 216,838 | 34,061 | 5,169 | 15.7 | 2.4 |
| Ontario | 262,721 | 35,583 | 12,279 | 13.5 | 4.7 |
| Prairies | 142,773 | 23,176 | 2,994 | 16.2 | 2.1 |
| Manitoba | 32,598 | 4,829 | 592 | 14.8 | 1.8 |
| Saskatchewan | 40,276 | 10,405 | 2,532 | 25.8 | 6.3 |
| Alberta | 69,899 | 7,943 | 1,483 | 11.4 | 2.1 |
| British Columbia | 90,112 | 14,667 | 2,804 | 16.3 | 3.1 |
| Territories | 1,479 | 278 | 70 | 18.8 | 4.7 |
| Yukon | 748 | 222 | 69 | 29.7 | 9.2 |
| Northwest Territories | 731 | 55 | 15 | 7.5 | 2.1 |
| **Selected CMAs** | | | | | |
| Montréal | 70,552 | 8,767 | 1,611 | 12.4 | 2.3 |
| Toronto | 38,210 | 5,396 | 1,524 | 14.1 | 4.0 |
| Vancouver | 29,711 | 4,889 | 1,451 | 16.5 | 4.9 |

**Table 6.5  Undercoverage Rates for Households and Persons, and Overcoverage Rates for Dwellings, 1996 Vacancy Check**

| Characteristics | Undercoverage | | | | Overcoverage | |
| --- | --- | --- | --- | --- | --- | --- |
| | Households[1] | | Persons[2] | | Dwellings[3] | |
| | Rate (%) | Standard error (%) | Rate (%) | Standard error (%) | Rate (%) | Standard error (%) |
| **Canada** | **0.42** | **0.03** | **0.30** | **0.02** | **1.09** | **0.13** |
| Newfoundland | 0.30 | 0.09 | 0.20 | 0.06 | 2.26 | 0.49 |
| Prince Edward Island | 0.24 | 0.07 | 0.18 | 0.05 | 2.61 | 0.47 |
| Nova Scotia | 0.31 | 0.07 | 0.20 | 0.04 | 0.83 | 0.18 |
| New Brunswick | 0.19 | 0.07 | 0.12 | 0.05 | 0.96 | 0.12 |
| Quebec | 0.34 | 0.04 | 0.24 | 0.03 | 1.20 | 0.18 |
| Ontario | 0.52 | 0.06 | 0.36 | 0.04 | 0.90 | 0.31 |
| Manitoba | 0.36 | 0.06 | 0.22 | 0.04 | 1.15 | 0.14 |
| Saskatchewan | 0.27 | 0.06 | 0.16 | 0.03 | 2.77 | 0.67 |
| Alberta | 0.41 | 0.05 | 0.31 | 0.04 | 0.81 | 0.15 |
| British Columbia | 0.48 | 0.07 | 0.36 | 0.05 | 1.02 | 0.20 |
| Yukon | 0.98 | 0.23 | 0.64 | 0.14 | 1.92 | 0.60 |
| Northwest Territories | 0.08 | 0.04 | 0.06 | 0.03 | 0.29 | 0.08 |
| **Selected CMAs** | | | | | | |
| Montréal | 0.29 | 0.05 | 0.18 | 0.03 | 0.65 | 0.12 |
| Toronto | 0.45 | 0.10 | 0.30 | 0.07 | 0.36 | 0.10 |
| Vancouver | 0.46 | 0.10 | 0.37 | 0.08 | 0.70 | 0.21 |

[1]  Obtained by calculating the ratio of the number of households missed (owing to the misclassification of unoccupied dwellings) to the total number of households that should have been enumerated, that is, the number of enumerated households plus the undercoverage of households obtained by the 1996 Reverse Record Check minus the overcoverage of households obtained by the 1996 Reverse Record Check, the 1996 Automated Match Study, and the 1996 Collective Dwelling Study.

[2]  Obtained by calculating the ratio of the number of persons missed (owing to the misclassification of unoccupied dwellings) to the total number of persons who should have been enumerated, that is, the number of enumerated persons plus the undercoverage of persons obtained by the 1996 Reverse Record Check minus the overcoverage of persons obtained by the 1996 Reverse Record Check, the 1996 Automated Match Study, and the 1996 Collective Dwelling Study.

[3]  Obtained by calculating the ratio of the number of structures not in the housing stock and erroneously classified as unoccupied dwellings to the total number of dwellings in the housing stock, that is, the total number of enumerated dwellings minus the enumerated dwellings not in the housing stock.

# VII. Reverse Record Check

## A. Introduction

Following each census since 1966, the Reverse Record Check (RRC) has been carried out to measure gross undercoverage, that is, to estimate the number of persons and households missed in the census. The RRC results are combined with the findings of the other coverage studies to calculate net undercoverage. In 1996, for the first time, the Private Dwelling Study carried out for 1991 to measure overcoverage, was incorporated into the RRC.

The main objectives of the 1996 RRC were:

(a)     to study the effects of population undercoverage in the 1996 Census and produce estimates of undercoverage for provinces and territories and for some major subgroups of the population;

(b)     to obtain an indication of the extent of household undercoverage in the 1996 Census;

(c)     to study the characteristics of individuals and households missed in the census and identify possible reasons for the errors;

(d)     to obtain an indication of the level of overcoverage of individuals and households living in private dwellings in the 1996 Census.

Population and household undercoverage is generally regarded as one of the most important sources of error affecting census data. It causes a downward bias to the extent that the census figures underestimate the true population and household counts. Overcoverage, on the other hand, results in an upward bias whereby census data overestimate the true population and household counts. These two sources of error may also distort the distribution of population and household characteristics estimated from census data if overcounted and uncounted persons do not have the same characteristics as enumerated individuals.

## B. Methodology

The target population of the 1996 RRC was the same as that of the 1996 Census—all persons living in Canada on May 14, 1996, Canadian government employees and military personnel posted abroad, and persons aboard Canadian-flagged merchant vessels. Hence, the RRC sample was made up of persons who should have been enumerated in the 1996 Census and was selected from sources independent of the census. Shortly after the census, tracing operations were undertaken to contact and interview Selected Persons (SPs) from the sample and find out where they were living on Census Day (May 14, 1996). Subsequently, census documents were searched to determine whether the SPs had been enumerated in 1996 and, if so, whether they had been enumerated more than once or erroneously (e.g., deceased persons who were enumerated).

Following these tracing and searching operations, each SP was classified as either "enumerated once", "enumerated more than once", "missed", "deceased", "deceased and enumerated in error", "emigrated", "emigrated and enumerated in error", "abroad", "out of scope", "not identified", "not traced", or "not classified". The results were then weighted to reflect the size of the population.

### 1. Sample Frame Construction and Sample Selection

The target population, which consisted of all persons who should have been enumerated in the 1996 Census, was formed from six sources or sampling frames. The first five frames were used to estimate undercoverage in the 10 provinces,

whereas estimates for the two territories were calculated on the basis of samples from the sixth frame. A total of 57,016 persons were selected for the sample. Table 7.1 gives the distribution of the sample among the frames.

**Table 7.1 Sample Frames, 1996 Reverse Record Check**

| Sample frame | Definition | Sample size (persons) |
|---|---|---|
| Census | All persons enumerated in the 1991 Census | 42,065 |
| Missed | All persons not enumerated in the 1991 Census | 2,341 |
| Births | All children born between June 4, 1991, and May 13, 1996 | 3,390 |
| Immigrants | All landed immigrants who arrived in Canada between June 4, 1991, and May 13, 1996 | 2,605 |
| Permit holders and refugees | All persons holding employment or student authorizations or Minister's permits (including extensions) and persons claiming refugee status who were in Canada on May 14, 1996 | 1,465 |
| Health Care Files | All persons listed in the health insurance files of the Yukon and the Northwest Territories who were in Canada on May 14, 1996 | 5,150 |
| **Total** | | **57,016** |

Sampling was carried out independently within each frame. The sample design varied from frame to frame depending on the nature of the list used. The sampling rates within frames were not uniform. To improve the efficiency of the sample, higher sampling rates were applied in subgroups for which high undercoverage or a lower tracing rate was expected.

In the Census frame, two-stage sampling with geographic stratification used for the 1991 RRC was replaced by single-stage sampling with demographic stratification and optimum allocation based on historical tracing and undercoverage rates and stratum size. The population was stratified by province of residence, sex, age, and marital status. Persons enumerated on Indian reserves and in collective dwellings were placed in separate strata. A sample was then selected within each stratum in order to include the largest possible number of "missed" cases. The sampling fractions were not th same in all strata. For example, males aged 20 to 29 in 1996 had a greater probability of being selected since it had been observed in previous RRCs that undercoverage was consistently higher in that stratum.

For the Births frame, copies of all birth registrations for the intercensal period were obtained from Vital Statistics. The frame was then stratified by province of residence and year of birth. The Immigrants frame was constructed using immigration records from Employment and Immigration Canada. It was stratified by year of arrival in Canada. Then, single-stage sampling was used for each of these frames.

The Missed frame is a conceptual frame since there is no list of all persons not enumerated in the 1991 Census. The sample for that frame consists of all cases classified as "not enumerated" in the 1991 RRC. The sample is not stratified as such, although there is implicit stratification since cases not enumerated in 1991 came from different frames and strata in the 1991 RRC.

Permit holders were grouped by province and type of permit. The refugee list was stratified by province. Single-stage samples were selected within each stratum.

Finally, age, sex, area (urban or rural), and, for the Northwest Territories only, Aboriginal status were used to form strata for each territory within the Health Care Files frame. Single-stage samples were selected within the strata.

One problem with multiple frames is that persons may be listed on more than one frame. For example, a person in the Immigrants frame may have been in Canada on a work permit in June 1991 and thus would have been enumerable in the 1991 Census. That person would then be in the Immigrants frame and in the Census frame if he or she were

enumerated, or represented by the Missed frame if they were not enumerated. It is important to identify all potential cases of frame overlap; if this is not done, estimates could be too high because people have been double-counted. Another problem is that none of the sample frames cover persons who had emigrated or were out of the country at the time of the 1991 Census and returned during the intercensal period ("returning Canadians"). It is estimated that there are 116,000 such persons, but the number of "missed" cases has not been estimated.

## 2. Tracing and Searching Operations and Verification of Classification

The purpose of the various RRC operations was to classify each SP as one of the following:

(a)     enumerated once in the 1996 Census;

(b)     enumerated more than once in the 1996 Census;

(c)     missed in the 1996 Census;

(d)     died before the 1996 Census;

(e)     emigrated before the 1996 Census;

(f)     temporarily abroad at the time of the 1996 Census;

(g)     out of scope, that is, the SP should not be included in the 1996 Census (for example, babies born after
        May 14, 1996, permit holders and refugees who were no longer in Canada) or covered by more than one frame;

(h)     not identified, that is, an identifier such as name, date of birth or sex was missing, and as a result there was
        insufficient information to initiate or validate the tracing process;

(i)     not traced, that is, the SP was not contacted and interviewed to determine whether he or she belonged to the
        census target population and, if so, what his or her usual residence was on Census Day;

(j)     not classified, that is, it was determined through contact that the SP was part of the target population but there was
        insufficient information to assign a final classification (because the addresses were too vague).

This classification was achieved by two operations: tracing and searching. The purpose of tracing was to establish the SP's address and status on Census Day 1996. Searching consisted of checking 1996 Census documents (visitation records and questionnaires) and the database to determine whether the SP had in fact been enumerated.

Since most of the addresses obtained at the time the sample was selected dated back to the 1991 Census, a match with administrative files was done to update the addresses of the SP and each member of his or her household. Updated information about other members of the household is one of the biggest improvements made in the RRC in 1996. Tracing the SP was much easier with the additional information. In cases where there was a match, the linkage provided an address that generally dated from the spring of 1995.

The information was sent to Statistics Canada's regional offices, and interviewers tried to contact each SP at his or her current address and conduct a telephone interview. Interviewers were instructed to make every effort to reach the SP (or, in the case of a child, an adult responsible for the SP), but if they were unable to do so, they interviewed a person in the same household or who knew the SP well enough to complete the questionnaire. The interviewers collected information about the SP's exact address on Census Day and any other addresses where the SP might have been enumerated, along with the names and socio-demographic and economic characteristics of persons who were living with the SP at that time.

On the basis of the information obtained through telephone tracing and interviewing, SPs were classified as either contacted, deceased, emigrated, temporarily abroad, or not traced.

For all contacted cases in which telephone tracing yielded one or more possible addresses for the SP on Census Day, a search of the 1996 Census documents for each address was carried out. The search consisted of three steps: first, automated conversion of the address(es) into a search area consisting of one or more enumeration areas; second, an automated search of the census database within the search area for potential matches according to similar characteristics (date of birth and sex) of the SP and household members; and third, a manual search of the census questionnaires of the potential matches to determine whether the SP's name and address were there. This strategy of matching the SP's household, rather than just the SP, in the census database was the most significant improvement in data processing for the 1996 RRC. These operations determined whether the SP should have been enumerated, was enumerated or was enumerated at more than one address.

For cases not contacted, search operations were conducted using the addresses identified during the preparations for tracing.

For cases not found on a census questionnaire at this point in the RRC processing, or for cases that had not been sent for tracing because they were selected late, follow-up was carried out at Statistics Canada's regional offices. An interviewer attempted to contact the SP in order to find out where he or she was on Census Day and why he/she was not enumerated. If the interviewer was successful, the census questionnaire for the new address was searched in an effort to find the SP. Additional information was collected in 87% of all follow-ups.

A new operation was introduced in the 1996 RRC. Known as the mega-match, this operation helped classify SPs as enumerated at addresses not identified during tracing or at unsearchable addresses. It consisted of matching the SP's household against the 1996 Census database, using day, month and year of birth and sex, and identifying all households in the database with two or more matching members. In a few cases, we were able to find an address at which members of the SP's household were enumerated but the SP was not.

Prior to final classification, additional searching was done for all SPs that had not yet been found enumerated. Efforts were made to identify other addresses using electronic telephone books or a Revenue Canada database.

Following all these steps, all SPs were classified into one of the categories mentioned at the beginning of this section.

To be classified as "enumerated once" or "enumerated more than once", an SP had to be included in a census questionnaire (name, date of birth and sex), and there had to be a record for that person in the census database. These cases were matched against the census database to confirm their enumerated status. In addition, for a large sample of the cases, the questionnaires for the enumeration address were checked again.

An SP was classified as "missed" when it was confirmed that the person was alive and in Canada on Census Day but did not appear in any census questionnaires for the traced addresses. A detailed review was done of all "missed" cases to ensure that all possible addresses had been identified and searched.

For "deceased" cases, administrative records of deaths (available at Statistics Canada) were checked to ensure that the SP had in fact died before May 14, 1996. In some uncertain cases, a search was conducted for the last address of residence obtained through telephone tracing. This type of verification could not be done for SPs classified as "emigrated prior to May 14, 1996" since emigration records are not kept in Canada. In some cases, however, it was possible to use Revenue Canada's database to confirm emigration. Classification of these cases depended on the reliability of the information source. Finally, for SPs classified as "temporarily abroad", a search of the questionnaire for the last known address of residence in Canada was carried out to ensure that these persons had not been listed at that address by others.

A number of cases were reclassified on the basis of these verifications. Table 7.2 shows the final distribution of the sample by category and frame. Of the 57,016 SPs originally selected for the sample, 2,292 (4.0% of the sample) were missed in the 1996 Census, while 49,198 (86.3%) were enumerated. Furthermore, 2,292 SPs (4.0%) were non-respondents for the purposes of the study (this includes SPs who were "not identified", "not traced" and "not classified"). The remaining 3,234 (5.7%), who were either deceased or no longer residing in Canada ("emigrated", "abroad" or "out of scope"), made up the sample attrition. It is important to note that these figures are crude, unweighted results and are not to be taken as census coverage and undercoverage rates.

## 3. Creation of a Final Database and Estimation

The process of creating a final database consisted of five main steps:

(a)     capture and edit of selected data from the RRC questionnaire;

(b)     imputation of item non-response for the RRC questionnaire;

(c)     incorporation of address search and classification results;

(d)     processing for total non-response and other weight adjustments; and

(e)     calculation of final estimates of undercoverage and standard errors.

All data in the RRC questionnaires were captured. Some questions were similar to questions asked in the census questionnaire. They were included so that estimates of undercoverage could be produced for various population and household subgroups. These data formed the core of the final database.

In some cases, the data for one or more questions were missing or inaccurate. Wherever possible, an attempt was made to obtain the required information from other sources such as sample frames and administrative records. Imputation was performed only as a last resort; it was necessary in very few cases.

The results of address processing and SP classification, discussed in the previous section, were added to the final database.

The first step in producing estimates from the final classification of the RRC sample was to adjust the sampling weights of respondents to take account of all types of non-respondents ("not identified", "not traced" and "not classified"). The overall non-response rate was 4.01%, with not-traced SPs accounting for the majority of non-response cases. In essence, the adjustment consisted in redistributing the weight of non-respondents among respondents. This redistribution was done within groups of respondents and non-respondents assumed to have a similar probability of being missed in the census; these groups are known as adjustment groups. A major criterion in forming adjustment groups is the SP's potential mobility, since it is reasonable to assume that a person changing residence is more likely to be missed than a person who is not mobile.

Adjustment for non-response was carried out in three independent steps. Firstly, the sum of the weights of not-identified cases was distributed among respondents in the same adjustment group. These weight adjustment groups corresponded, more or less, to the stratum in which the SP was originally selected. Next, the same procedure was followed for not-traced and not-classified cases. The weight of these non-respondents was distributed among all of the respondents in the same adjustment group with one exception. Among those classified as enumerated, only those who had recently moved were eligible to receive the weight of the not traced and the not classified.

The final step was a post-stratification, or "weight adjustment" to ensure compatibility with known totals in the sample frame populations. First, it was necessary to take into account that the Health Care Files of the territories provided

incomplete coverage of the population. Second, an adjustment was made for non-permanent residents using more precise figures. Finally, age and sex differences between the census database and the RRC database were addressed as outliers.

An extra weight adjustment was carried out for those SPs classified as enumerated more than once. In some cases, the addresses provided by the SP were too vague to identify a particular address. The weight adjustment accounted for this type of non response.

Tables 7.2 and 7.3 show the unweighted and weighted (final weights) distribution of the RRC sample among the final classification categories.

Table 7.4 gives the results of the overcoverage component of the RRC. The unweighted and weighted number of SPs found to have been enumerated more than once or enumerated in error is given. The split between those cases covered by either the Automated Match Study (AMS) or the Collective Dwelling Study (CDS) and those cases which represent overcoverage that can only be measured by the RRC is also presented in Table 7.4. It is only the latter component that contributes to the overall estimates of population and household overcoverage as described in Chapter X. Although the RRC measures the same types of overcoverage as the AMS and the CDS, it does so with much less accuracy. That is, the weights of the RRC overcoverage cases are higher than the weights for the AMS or CDS overcoverage cases.

**Table 7.2  Sample Distribution by Final Classification and Frame, 1996 Reverse Record Check[1]**

| Frame | Census | | Births | | Immigrants | | Missed | | Permit holders and refugees | | Health Care Files | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Final Classification of Selected Persons | Number | Per-centage | Number | Per-centage | Number | Per-centage | Number | Per-centage | Number | Per-centage | Number | Per-centage | Number | Per-centage |
| Enumerated (at least once) | 37,608 | 89.5 | 3,117 | 92.0 | 1,726 | 66.2 | 1,510 | 64.6 | 716 | 48.9 | 4,521 | 87.8 | 49,198 | 86.4 |
| Missed | 1,347 | 3.2 | 86 | 2.5 | 184 | 7.1 | 212 | 9.0 | 209 | 14.3 | 254 | 4.9 | 2,292 | 4.0 |
| Deceased | 1,348 | 3.2 | 22 | 0.6 | 7 | 0.3 | 60 | 2.6 | 1 | 0.1 | 11 | 0.2 | 1,449[2] | 2.5 |
| Emigrated | 271 | 0.6 | 18 | 0.5 | 72 | 2.8 | 33 | 1.4 | 0 | 0.0 | 6 | 0.1 | 400[3] | 0.7 |
| Abroad | 132 | 0.3 | 18 | 0.5 | 50 | 1.9 | 20 | 0.8 | 0 | 0.0 | 14 | 0.3 | 234 | 0.4 |
| Out of scope | 59 | 0.1 | 6 | 0.2 | 351 | 13.5 | 349 | 14.9 | 251 | 17.1 | 135 | 2.6 | 1,151 | 2.0 |
| Not identified | 400 | 1.0 | 13 | 0.4 | 0 | 0.0 | 0 | 0.0 | 27 | 1.8 | 0 | 0.0 | 440 | 0.8 |
| Not traced | 686 | 1.6 | 97 | 2.9 | 193 | 7.4 | 125 | 5.3 | 224 | 15.3 | 107 | 2.1 | 1,432 | 2.5 |
| Not classified | 214 | 0.5 | 13 | 0.4 | 22 | 0.8 | 32 | 1.4 | 37 | 2.5 | 102 | 2.0 | 420 | 0.7 |
| **Total** | **42,065** | **100.0** | **3,390** | **100.0** | **2,605** | **100.0** | **2,341** | **100.0** | **1,465** | **100.0** | **5,150** | **100.0** | **57,016** | **100.0** |

[1]  These figures are crude, unweighted results and are not to be taken as census coverage and undercoverage rates.
[2]  Includes 3 cases enumerated in error.
[3]  Includes 8 cases enumerated in error.

**Table 7.3 Weighted Sample Distribution by Final Classification and Frame, 1996 Reverse Record Check[1]**

| Frame | Census | | Births | | Immigrants | | Missed | | Permit holders and refugees | | Health Care Files | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Classification of selected persons | Number | Per-centage | Number | Per-centage | Number | Per-centage | Number | Per-centage | Number | Per-centage | Number | Per-centage | Number | Per-centage |
| Enumerated (at least once) | 24,902,996 | 92.3 | 1,803,804 | 94.6 | 807,556 | 69.3 | 855,025 | 72.7 | 143,775 | 60.3 | 98,411 | 90.4 | 28,611,567 | 90.5 |
| Missed | 722,255 | 2.7 | 51,302 | 2.7 | 84,743 | 7.3 | 120,715 | 10.3 | 44,524 | 18.7 | 5,699 | 5.2 | 1,029,238 | 3.3 |
| Deceased | 1,030,017 | 3.8 | 14,647 | 0.8 | 2,382 | 0.2 | 34,086 | 2.9 | 181 | 0.1 | 291 | 0.3 | 1,081,605 | 3.4 |
| Emigrated | 210,143 | 0.8 | 15,086 | 0.8 | 34,461 | 3.0 | 22,586 | 1.9 | 0 | 0.0 | 208 | 0.2 | 282,485 | 0.9 |
| Abroad | 97,474 | 0.4 | 16,374 | 0.9 | 24,859 | 2.1 | 15,764 | 1.3 | 0 | 0.0 | 381 | 0.4 | 154,852 | 0.5 |
| Out of scope | 30,037 | 0.1 | 4,714 | 0.2 | 211,111 | 18.1 | 128,369 | 10.9 | 49,904 | 20.9 | 3,770 | 3.5 | 427,905 | 1.4 |
| Total | 26,992,922 | 100.0 | 1,905,927 | 100.0 | 1,165,113 | 100.0 | 1,176,545 | 100.0 | 238,385 | 100.0 | 108,760 | 100.0 | 31,587,652 | 100.0 |

[1] These figures are crude results and are not to be taken as census coverage and undercoverage rates.

**Table 7.4  Unweighted and Weighted Number of Cases of Overcoverage, 1996 Reverse Record Check**

| | Number of Selected Persons found overcovered | | | Weighted number of Selected Persons found overcovered | | |
|---|---|---|---|---|---|---|
| | Covered by AMS or CDS | Not covered by AMS or CDS | Total | Covered by AMS or CDS | Not covered by AMS or CDS | Total |
| Newfoundland | 10 | 19 | 29 | 2,373 | 2,854 | 5,227 |
| Prince Edward Island | 3 | 18 | 21 | 180 | 764 | 944 |
| Nova Scotia | 11 | 10 | 21 | 3,066 | 1,814 | 4,880 |
| New Brunswick | 2 | 13 | 15 | 631 | 2,725 | 3,356 |
| Quebec | 17 | 39 | 56 | 17,038 | 36,715 | 53,753 |
| Ontario | 10 | 40 | 50 | 11,054 | 33,678 | 44,732 |
| Manitoba | 6 | 18 | 24 | 1,305 | 6,331 | 7,636 |
| Saskatchewan | 4 | 10 | 14 | 979 | 3,139 | 4,118 |
| Alberta | 2 | 20 | 22 | 2,266 | 10,259 | 12,525 |
| British Columbia | 13 | 31 | 44 | 5,784 | 17,069 | 22,853 |
| Yukon | 4 | 6 | 10 | 66 | 142 | 208 |
| Northwest Territories | 4 | 17 | 21 | 113 | 402 | 515 |
| **Canada** | **86** | **241** | **327** | **44,855** | **115,893** | **160,748** |

AMS = Automated Match Study
CDS = Collective Dwellings Study

# VIII. Automated Match Study

## A. Methodology

Most of the overcoverage in the census is caused by persons who are present more than once on the census database. The Automated Match Study (AMS) was designed to detect and estimate overcoverage between private dwellings by searching the census database for pairs of households containing persons that have the same sex and full date of birth characteristics in the same geographic region (Atlantic, Quebec, Ontario, rest of Canada). Two sets of programs were put in place. The first set identified pairs of census households in the same region with at least two exact person matches (306,557 matches), whereas the second set identified pairs in the same Federal Electoral District (FED) with only one exact person match (689,747 matches). The pairs of households were then stratified. The census questionnaires for a sample of pairs from each stratum were compared manually to determine if overcoverage had occurred. That is, the list of persons on one questionnaire was compared to the persons listed on the questionnaire for the other household. Whenever the same persons were on both questionnaires, overcoverage was said to have occurred.

In 1991, the automated matching operation was limited to comparing households within the same enumeration area (EA). In 1996, the AMS was expanded substantially to compare households within the same geographic region (Atlantic, Quebec, Ontario, rest of Canada).

## B. Sample Design and Processing

The 996,304 pairs of households identified by the AMS constituted the sampling frame. Stratification was guided by the desire to produce strata that were both meaningful and of a reasonable size. The goal was to group pairs of households with similar probabilities of being overcovered together. The frame of pairs of households was stratified on the basis of province, geographic proximity, the number of exact and near matches, and the number of persons in each household. The measures of geographic proximity were:

- the two households were within the same EA;
- the two households were within the same FED, but in different EAs;
- the two households were within the same province, but in different FEDs; and
- the two households were within the same region (Atlantic, Quebec, Ontario, rest of Canada), but in different provinces.

Within each stratum, a sample of pairs of households was selected and their census questionnaires were checked to determine if the same persons were listed on both of them. No sample was selected from strata containing fewer than 250 pairs nationally. A total of 7,688 pairs of households were verified and 12,548 persons in 3,472 pairs of households were listed on two census questionnaires. These persons were weighted according to the sampling design.

Table 8.1 shows the number of matched pairs of households in the frame, the number of pairs of households verified, and the number of persons listed on both census questionnaires.

**Table 8.1  Sample Size and Number of Overcovered Persons, 1996 Automated Match Study**

| Province/territory | Frame | Sample | Number of persons found overcovered |
|---|---|---|---|
| | Number of pairs matched *households* | Number of pairs verified *households* | |
| **Canada** | **996,304** | **7,688** | **12,548** |
| Newfoundland | 8,806 | 413 | 605 |
| Prince Edward Island | 1,542 | 214 | 284 |
| Nova Scotia | 18,952 | 511 | 756 |
| New Brunswick | 13,058 | 465 | 621 |
| Quebec | 264,958 | 1,332 | 1,744 |
| Ontario | 433,381 | 1,629 | 3,108 |
| Manitoba | 26,654 | 565 | 858 |
| Saskatchewan | 20,094 | 534 | 496 |
| Alberta | 77,526 | 830 | 1,066 |
| British Columbia | 129,855 | 960 | 2,717 |
| Yukon | 385 | 89 | 59 |
| Northwest Territories | 1,093 | 146 | 237 |
| Nunavut | 653 | 47 | 78 |
| Northwest Territories – west | 440 | 99 | 159 |

# IX. Collective Dwelling Study

## A. Stratification, Sample Selection, and Data Collection

This study covered all persons who were enumerated as usual residents in a collective dwelling and measured overcoverage resulting from respondent error when two census questionnaires were completed at different dwellings. A collective dwelling is a dwelling of commercial, institutional, or communal nature where there are generally at least 10 unrelated persons living under the same roof. Collective dwellings are of two types: institutional dwellings such as hospitals and jails, and non-institutional dwellings such as hotels, YMCAs, and school residences.

During the enumeration of collective dwellings on Census Day, the census representatives assigned to institutional collective dwellings recorded an alternative address for all residents (e.g. patients, inmates) using information from the institutions' administrative records. Live-in staff of institutional collective dwellings and usual residents of non-institutional collective dwellings completed an individual census form on which they were asked to report an alternative address. These addresses provided a sampling frame for the Collective Dwelling Study (CDS).

The CDS consisted of two components. The institutional component covered institutional collective dwellings, and the non-institutional component covered non-institutional collective dwellings. Optimal allocation based on the number of usual residents was used to split the sample between the two components. For the institutional component, the sample was allocated to each province according to the number of usual residents in institutional collective dwellings. The sample was selected in two stages. First a sample of 891 institutions was chosen and then a sample of 8,818 usual residents was taken from the selected institutions. For the non-institutional component, the sample was also allocated to each province according to the number of usual residents in non-institutional collective dwellings. A sample of 265 enumeration areas was then chosen. All of the usual residents of the non-institutional collective dwellings in the selected enumeration areas, 3,743 persons, formed the non-institutional sample.

## B. Processing

The data were processed through steps similar to those applied to the Reverse Record Check. For each individual in the sample, the questionnaires completed at their alternative address were verified to determine if they were enumerated a second time. If they were found on the questionnaire, there was overcoverage. There were 7,048 Selected Persons (SPs) with an alternate address and 5,513 SPs without an alternate address. There were 130 SPs from the non-institutional sample found enumerated at a private dwelling and 432 SPs from the institutional sample.

For 54 SPs in the non-institutional sample and 117 SPs in the institutional sample, the addresses recorded on the census questionnaire were too vague to identify a particular census questionnaire. Initial design weights, consisting of the inverse of the probability of selection, were adjusted to account for this type of non-response. Basically, the weights of the non-respondents were distributed among the respondents. In the institutional component, the weights were further adjusted to ensure consistency with census counts at the province level.

Table 9.1 shows the distribution of the final sample and the number of overcoverage cases detected in each component.

**Table 9.1  Sample Size and Number of Overcovered Persons, 1996 Collective Dwelling Study**

| Province/territory | Institutional collectives | | Non-institutional collectives | |
|---|---|---|---|---|
| | Number of persons in sample | Cases of overcoverage | Number of persons in sample | Cases of overcoverage |
| Canada | 8,818 | 432 | 3,743 | 130 |
| Newfoundland | 102 | 1 | 94 | 5 |
| Prince Edward Island | 69 | 4 | 87 | 0 |
| Nova Scotia | 321 | 8 | 50 | 8 |
| New Brunswick | 293 | 12 | 37 | 3 |
| Quebec | 2,068 | 118 | 1,034 | 21 |
| Ontario | 2,714 | 177 | 1,031 | 41 |
| Manitoba | 491 | 26 | 48 | 4 |
| Saskatchewan | 511 | 16 | 212 | 9 |
| Alberta | 963 | 41 | 731 | 22 |
| British Columbia | 1,211 | 29 | 266 | 17 |
| Yukon | 33 | 0 | 120 | 0 |
| Northwest Territories | 42 | 0 | 33 | 0 |

# X. Coverage Error Estimates

## A. Methodology

Let

$\hat{M}$    be the estimate of the number of persons not enumerated at their usual place of residence, as obtained from the 1996 RRC by summing the adjusted weights of those persons in the RRC sample with a final classification of "not enumerated in the 1996 Census";

$C$    be the published 1996 Census count;

$\hat{VC}$    be the estimate of the number of persons not enumerated because they occupied dwellings classified by the census representative as unoccupied, as obtained from the Vacancy Check;

$\hat{O}_{AMS}$    be the estimate of the number of overcovered persons measured by the Automated Match Study;

$\hat{O}_{CDS}$    be the estimate of the number of overcovered persons measured by the Collective Dwelling Study;

$\hat{O}_{RRC}$    be the estimate of the number of overcovered persons measured by the Reverse Record Check, net of the overcoverage included in the Automated Match Study and the Collective Dwelling Study; and

$\hat{O}$    be the estimate of the number of persons enumerated more than once or in error where $\hat{O} = \hat{O}_{AMS} + \hat{O}_{CDS} + \hat{O}_{RRC}$.

Note that $C$ includes $\hat{VC}$. That is, as described in Section B4 of Chapter VI, a process was carried out whereby an estimate of the number of persons not enumerated because they occupied dwellings classified by the census representative as unoccupied was added to the count of persons actually enumerated to produce the published census counts.

The population undercoverage rate $\hat{R}_U$ indicating the proportion of persons missed by the 1996 Census as a proportion of the total number of persons who should have been enumerated was calculated as follows:

$$\hat{R}_U = \frac{\hat{M} - \hat{VC}}{C + (\hat{M} - \hat{VC}) - \hat{O}}$$

The number of persons who should have been enumerated is the total of the number of persons actually enumerated, $C - \hat{VC}$, plus the number of persons who should have been enumerated but were not, $\hat{M}$, less the number of persons enumerated who should not have been enumerated, $\hat{O}$. $\hat{VC}$ is subtracted from $C$ because the published census count includes an estimate of the number of persons who were erroneously excluded because they occupied dwellings misclassified as vacant. Since $\hat{R}_U$ indicates the extent of undercoverage in published census counts, it is necessary to subtract $\hat{VC}$ as these persons are already included in $C$ as the RRC estimates $\hat{M}$, the total number of persons not enumerated at their usual place of residence.

The population overcoverage rate $\hat{R}_O$ was calculated as follows:

$$\hat{R}_O = \frac{\hat{O}}{C + (\hat{M} - \hat{VC}) - \hat{O}}$$

The population net undercoverage rate $\hat{R}_N$ was calculated as follows:

$$\hat{R}_N = \hat{R}_U - \hat{R}_O = \frac{(\hat{M} - \hat{V}C) - \hat{O}}{C + (\hat{M} - \hat{V}C) - \hat{O}}$$

Rates of undercoverage, overcoverage, and net undercoverage for households were calculated in a similar fashion. In this case, $\hat{M}$ was the number of households in which all of the household members were not enumerated at their usual place of residence, as obtained by the 1996 RRC, whereas $\hat{O}$ referred to households where all of the household members were enumerated more than once or in error.

# B. Results

Tables 10.1, 10.2, and 10.3 give the main results of the coverage studies. Table 10.1 presents the number of persons missed, the undercoverage rate, the number of overcovered persons, the overcoverage rate, the net number of persons missed, and the net undercoverage rate for Canada and for the provinces and territories. Table 10.2 gives the same data by gender and age group. Table 10.3 presents the number of households missed, the undercoverage rate, the number of overcovered households, the overcoverage rate, the net number of households missed, and the net undercoverage rate for Canada and for the provinces and territories.

## 1. Undercoverage

The rate of population undercoverage was highest for the Northwest Territories (5.68%). Provincially, the rate was highest for British Columbia (4.58%). Undercoverage was less than the national rate east of Ontario whereas the rate for Ontario (3.40%) was slightly higher. There was greater variation in undercoverage between the gender and age groups. Undercoverage was generally higher for men than for women with the highest rates for young adults. The rates were strikingly high for those aged 20 – 24, 9.48% for males and 6.45% for females. These higher rates reflected a higher degree of residence mobility for young adults.

Household undercoverage rates were lower than population undercoverage rates. The rate of household undercoverage was highest for British Columbia (3.71%) and the territories. The 1996 Census missed fewer households in the Prairies, Newfoundland and Prince Edward Island. The rates for Quebec (2.30%) and Ontario (2.58%) were close to the national rate (2.49%).

## 2. Overcoverage

Table 10.4 gives the contribution by province of each overcoverage study to the estimate of total population overcoverage. The Automated Match Study measured overcoverage from persons enumerated in two households in the same region (Atlantic, Quebec, Ontario, rest of Canada). The estimate of this type of overcoverage is 93,688 persons. The Collective Dwelling Study measured overcoverage from persons enumerated in a collective dwelling and a private dwelling. The estimate of this type of overcoverage is 8,467 persons. Although the RRC measures overcoverage from all sources by asking Selected Persons for all addresses where they could have been enumerated, only the overcoverage not measured by the AMS and the CDS contributes to the estimate of the total number of overcovered persons. That is, the RRC was used to measure the following types of overcoverage:

- single persons enumerated in different dwellings;
- persons and households enumerated in different dwellings but who reported different characteristics (i.e sex and date of birth); and
- persons and households enumerated in different regions.

The estimate of this type of overcoverage is 115,893 persons.

The rate of population overcoverage was highest for the Northwest Territories (1.20%). Provincially, overcoverage was higher for Quebec (0.85%), Manitoba (0.88%), and British Columbia (0.89%). Overcoverage was lower for Nova Scotia (0.47%) and Saskatchewan (0.55%). Again, there was more variation between the gender and age groups. As for undercoverage, overcoverage was highest for young adults aged 20 – 24, also reflecting the higher degree of residence mobility. Unlike undercoverage, however, overcoverage was generally higher for females than for males. Apart from those aged 20 – 24, overcoverage was concentrated in children and youths aged 5 – 19 for both sexes. This phenomenon reflected the situation of children and youths with parents who did not reside in the same household as well as those who were enumerated more than once because their families moved around Census Day.

Household overcoverage was rare. Only 0.30% of all households that should have been enumerated were actually enumerated in error. The rate was highest for Manitoba (0.60%) and lowest for Alberta (0.12%).

## 3. Net Undercoverage

The net effect of undercoverage and overcoverage is given by the net undercoverage rates. That is, missed persons are offset by those who were enumerated in error. Provincially, net undercoverage increased from east to west. The rate was highest for British Columbia (3.68%). In Ontario, net undercoverage was slightly higher (2.73%) than the national rate (2.45%), whereas in Quebec, a high overcoverage rate offset a lower undercoverage rate, resulting in a net undercoverage rate (1.61%) that was smaller than the national rate. For the territories, net undercoverage was high for the Northwest Territories – west (5.22%), whereas the rates for Nunavut (3.29%) and the Yukon (3.22%) were close to the British Columbia rate.

Net undercoverage was notably high for young adults aged 20 – 34, and even higher for males in this age group. In the younger group, 20 – 24, a high overcoverage offset a very high undercoverage, whereas among the older group, 25 – 34, an overcoverage close to the national rate only slightly offset a high undercoverage. As for undercoverage, net undercoverage was consistently higher for males.

Since household overcoverage was rare, net household undercoverage parallels household undercoverage. Net undercoverage was higher for British Columbia and the territories with low net undercoverage for the Prairies, Newfoundland, and Prince Edward Island. In Manitoba, the higher overcoverage rate resulted in a net household undercoverage rate of 0.81%.

**Table 10.1 Estimated 1996 Census Population Coverage Error by Province/Territory**

| Province/territory | Population undercoverage | | | | Population overcoverage | | | | Population net undercoverage | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Estimated number | Standard error | Estimated rate (%) | Standard error (%) | Estimated number | Standard error | Estimated rate (%) | Standard error (%) | Estimated number | Standard error | Estimated rate (%) | Standard error (%) |
| Canada | 941,534 | 27,559 | 3.18 | 0.09 | 218,048 | 10,604 | 0.74 | 0.04 | 723,486 | 29,674 | 2.45 | 0.10 |
| Newfoundland | 13,758 | 1,666 | 2.45 | 0.29 | 4,334 | 660 | 0.77 | 0.12 | 9,424 | 1,759 | 1.68 | 0.31 |
| Prince Edward Island | 2,389 | 380 | 1.76 | 0.28 | 1,240 | 181 | 0.91 | 0.14 | 1,149 | 437 | 0.85 | 0.32 |
| Nova Scotia | 25,149 | 2,558 | 2.70 | 0.27 | 4,328 | 693 | 0.47 | 0.07 | 20,821 | 2,580 | 2.24 | 0.27 |
| New Brunswick | 18,703 | 2,192 | 2.49 | 0.28 | 4,478 | 742 | 0.60 | 0.10 | 14,225 | 2,354 | 1.89 | 0.31 |
| Quebec | 178,288 | 13,176 | 2.46 | 0.18 | 61,538 | 5,969 | 0.85 | 0.08 | 116,750 | 14,963 | 1.61 | 0.20 |
| Ontario | 375,964 | 20,337 | 3.40 | 0.18 | 74,596 | 7,172 | 0.67 | 0.07 | 301,368 | 21,265 | 2.73 | 0.19 |
| Manitoba | 28,900 | 3,410 | 2.55 | 0.29 | 10,019 | 1,712 | 0.88 | 0.15 | 18,881 | 3,875 | 1.67 | 0.34 |
| Saskatchewan | 33,628 | 3,323 | 3.30 | 0.32 | 5,577 | 1,066 | 0.55 | 0.11 | 28,051 | 3,521 | 2.75 | 0.34 |
| Alberta | 82,690 | 6,796 | 2.99 | 0.24 | 16,363 | 2,861 | 0.59 | 0.10 | 66,327 | 7,555 | 2.40 | 0.27 |
| British Columbia | 176,987 | 9,541 | 4.58 | 0.24 | 34,544 | 3,408 | 0.89 | 0.09 | 142,443 | 9,967 | 3.68 | 0.25 |
| Yukon | 1,245 | 169 | 3.92 | 0.51 | 223 | 55 | 0.70 | 0.17 | 1,022 | 167 | 3.22 | 0.51 |
| Northwest Territories | 3,833 | 335 | 5.68 | 0.47 | 809 | 103 | 1.20 | 0.16 | 3,024 | 357 | 4.48 | 0.51 |
| Nunavut | 1,095 | 178 | 4.28 | 0.67 | 254 | 56 | 0.99 | 0.22 | 841 | 180 | 3.29 | 0.68 |
| NWT – west | 2,738 | 284 | 6.54 | 0.63 | 554 | 89 | 1.32 | 0.22 | 2,184 | 309 | 5.22 | 0.70 |

**Table 10.2  Estimated 1996 Census Population Coverage Error by Age Group and Sex**

| Characteristics | Population undercoverage | | | | Population overcoverage | | | | Population net undercoverage | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Estimated number | Standard error | Estimated rate (%) | Standard error (%) | Estimated number | Standard error | Estimated rate (%) | Standard error (%) | Estimated number | Standard error | Estimated rate (%) | Standard error (%) |
| **Both Sexes** | 941,534 | 27,559 | 3.18 | 0.09 | 218,048 | 10,604 | 0.74 | 0.04 | 723,486 | 29,674 | 2.45 | 0.10 |
| 0 – 4 years | 56,768 | 7,197 | 2.89 | 0.36 | 11,919 | 1,914 | 0.61 | 0.10 | 44,849 | 7,552 | 2.29 | 0.38 |
| 5 – 14 years | 58,147 | 5,816 | 1.45 | 0.14 | 38,249 | 3,764 | 0.96 | 0.09 | 19,898 | 6,232 | 0.50 | 0.15 |
| 15 – 19 years | 69,813 | 8,667 | 3.48 | 0.42 | 24,870 | 3,003 | 1.24 | 0.15 | 44,943 | 9,907 | 2.24 | 0.48 |
| 20 – 24 years | 160,678 | 7,473 | 8.00 | 0.34 | 49,080 | 5,562 | 2.44 | 0.28 | 111,598 | 9,174 | 5.55 | 0.43 |
| 25 – 34 years | 275,628 | 14,407 | 5.81 | 0.29 | 31,239 | 3,609 | 0.66 | 0.08 | 244,389 | 15,363 | 5.15 | 0.31 |
| 35 – 44 years | 138,380 | 12,229 | 2.78 | 0.24 | 18,696 | 2,956 | 0.38 | 0.06 | 119,684 | 12,696 | 2.40 | 0.25 |
| 45 – 54 years | 71,462 | 7,976 | 1.90 | 0.21 | 18,108 | 3,958 | 0.48 | 0.11 | 53,354 | 9,255 | 1.42 | 0.24 |
| 55 – 64 years | 56,458 | 8,758 | 2.23 | 0.34 | 13,086 | 2,837 | 0.52 | 0.11 | 43,372 | 8,662 | 1.71 | 0.34 |
| 65 years and over | 54,201 | 9,497 | 1.52 | 0.26 | 12,803 | 2,374 | 0.36 | 0.07 | 41,398 | 9,842 | 1.16 | 0.27 |
| **Males** | 569,963 | 20,892 | 3.89 | 0.14 | 102,535 | 6,488 | 0.70 | 0.04 | 467,428 | 21,394 | 3.19 | 0.14 |
| 0 – 4 years | 25,674 | 4,842 | 2.56 | 0.47 | 5,255 | 872 | 0.52 | 0.09 | 20,419 | 4,948 | 2.04 | 0.48 |
| 5 – 14 years | 29,862 | 4,963 | 1.46 | 0.24 | 20,276 | 3,017 | 0.99 | 0.15 | 9,586 | 6,088 | 0.47 | 0.30 |
| 15 – 19 years | 37,896 | 4,539 | 3.68 | 0.43 | 11,578 | 2,398 | 1.12 | 0.24 | 26,318 | 4,947 | 2.56 | 0.47 |
| 20 – 24 years | 97,180 | 5,693 | 9.48 | 0.50 | 23,946 | 3,377 | 2.34 | 0.34 | 73,234 | 6,922 | 7.14 | 0.63 |
| 25 – 34 years | 185,462 | 10,756 | 7.74 | 0.42 | 15,675 | 2,660 | 0.65 | 0.11 | 169,787 | 10,161 | 7.08 | 0.39 |
| 35 – 44 years | 98,167 | 10,063 | 3.94 | 0.39 | 9,550 | 1,425 | 0.38 | 0.06 | 88,617 | 10,226 | 3.56 | 0.40 |
| 45 – 54 years | 39,785 | 5,164 | 2.12 | 0.27 | 6,646 | 1,299 | 0.35 | 0.07 | 33,139 | 5,356 | 1.76 | 0.28 |
| 55 – 64 years | 31,210 | 6,933 | 2.50 | 0.54 | 4,633 | 1,484 | 0.37 | 0.12 | 26,577 | 7,076 | 2.12 | 0.55 |
| 65 years and over | 24,726 | 6,967 | 1.64 | 0.45 | 4,974 | 372 | 0.33 | 0.02 | 19,752 | 6,977 | 1.31 | 0.46 |
| **Females** | 371,572 | 18,113 | 2.49 | 0.12 | 115,513 | 8,802 | 0.77 | 0.06 | 256,059 | 20,954 | 1.71 | 0.14 |
| 0 – 4 years | 31,095 | 5,432 | 3.24 | 0.55 | 6,662 | 1,704 | 0.69 | 0.18 | 24,433 | 5,774 | 2.55 | 0.59 |
| 5 – 14 years | 28,284 | 4,296 | 1.45 | 0.22 | 17,972 | 2,797 | 0.92 | 0.14 | 10,312 | 4,807 | 0.53 | 0.25 |
| 15 – 19 years | 31,918 | 5,610 | 3.28 | 0.55 | 13,292 | 2,772 | 1.36 | 0.29 | 18,626 | 7,108 | 1.91 | 0.72 |
| 20 – 24 years | 63,499 | 4,957 | 6.45 | 0.48 | 25,135 | 4,404 | 2.55 | 0.46 | 38,364 | 6,072 | 3.90 | 0.59 |
| 25 – 34 years | 90,165 | 9,818 | 3.84 | 0.40 | 15,565 | 2,421 | 0.66 | 0.11 | 74,600 | 11,332 | 3.18 | 0.47 |
| 35 – 44 years | 40,212 | 7,055 | 1.62 | 0.28 | 9,147 | 2,584 | 0.37 | 0.10 | 31,065 | 7,621 | 1.25 | 0.30 |
| 45 – 54 years | 31,677 | 6,255 | 1.68 | 0.33 | 11,462 | 3,735 | 0.61 | 0.20 | 20,215 | 7,689 | 1.07 | 0.40 |
| 55 – 64 years | 25,248 | 5,279 | 1.97 | 0.40 | 8,451 | 2,416 | 0.66 | 0.19 | 16,797 | 5,011 | 1.31 | 0.39 |
| 65 years and over | 29,474 | 6,739 | 1.43 | 0.32 | 7,829 | 2,305 | 0.38 | 0.11 | 21,645 | 7,195 | 1.05 | 0.35 |

## Table 10.3  Estimated 1996 Census Household Coverage Error

| Province/territory | Household undercoverage | | | | Household overcoverage | | | | Household net undercoverage | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Estimated number | Standard error | Estimated rate (%) | Standard error (%) | Estimated number | Standard error | Estimated rate (%) | Standard error (%) | Estimated number | Standard error | Estimated rate (%) | Standard error (%) |
| **Canada** | **275,003** | **13,978** | **2.49** | **0.12** | **32,356** | **2,987** | **0.30** | **0.03** | **242,647** | **14,375** | **2.19** | **0.13** |
| Newfoundland | 2,655 | 673 | 1.41 | 0.35 | 445 | 138 | 0.24 | 0.07 | 2,210 | 687 | 1.18 | 0.36 |
| Prince Edward Island | 689 | 192 | 1.42 | 0.39 | 148 | 43 | 0.31 | 0.09 | 541 | 198 | 1.12 | 0.40 |
| Nova Scotia | 8,865 | 1,477 | 2.53 | 0.41 | 758 | 229 | 0.22 | 0.07 | 8,107 | 1,524 | 2.31 | 0.42 |
| New Brunswick | 5,668 | 1,449 | 2.05 | 0.51 | 553 | 195 | 0.20 | 0.07 | 5,115 | 1,468 | 1.85 | 0.52 |
| Quebec | 66,109 | 5,897 | 2.30 | 0.20 | 9,661 | 1,948 | 0.34 | 0.07 | 56,448 | 6,466 | 1.96 | 0.22 |
| Ontario | 103,614 | 10,394 | 2.58 | 0.25 | 11,172 | 1,813 | 0.28 | 0.05 | 92,442 | 10,438 | 2.30 | 0.25 |
| Manitoba | 5,960 | 1,346 | 1.41 | 0.31 | 2,539 | 1,096 | 0.60 | 0.26 | 3,421 | 1,739 | 0.81 | 0.41 |
| Saskatchewan | 6,186 | 1,355 | 1.64 | 0.35 | 736 | 296 | 0.19 | 0.08 | 5,450 | 1,397 | 1.44 | 0.36 |
| Alberta | 19,234 | 3,018 | 1.93 | 0.30 | 1,169 | 40 | 0.12 | 0.00 | 18,065 | 3,018 | 1.81 | 0.30 |
| British Columbia | 54,637 | 5,358 | 3.71 | 0.35 | 5,094 | 662 | 0.35 | 0.05 | 49,543 | 5,412 | 3.36 | 0.35 |
| Yukon | 409 | 80 | 3.45 | 0.65 | 15 | 2 | 0.13 | 0.01 | 394 | 80 | 3.32 | 0.65 |
| Northwest Territories | 977 | 139 | 4.95 | 0.67 | 67 | 18 | 0.34 | 0.09 | 910 | 139 | 4.61 | 0.67 |
| Nunavut | 229 | 69 | 3.56 | 1.04 | 16 | 2 | 0.25 | 0.03 | 213 | 68 | 3.31 | 1.03 |
| NWT – west | 748 | 119 | 5.62 | 0.84 | 52 | 18 | 0.39 | 0.13 | 696 | 120 | 5.23 | 0.86 |

**Table 10.4  Contribution of 1996 Automated Match Study, 1996 Collective Dwelling Study, and 1996 Reverse Record Check to Total Population Overcoverage for Canada, Provinces and Territories**

| Province/territory | Number of overcovered persons | | | |
|---|---|---|---|---|
| | Automated Match Study | Collective Dwelling Study | Reverse Record Check | Total |
| | | | *exclusive of other studies* | |
| **Canada** | **93,688** | **8,467** | **115,893** | **218,048** |
| Newfoundland | 1,366 | 114 | 2,854 | 4,334 |
| Prince Edward Island | 445 | 31 | 764 | 1,240 |
| Nova Scotia | 2,098 | 416 | 1,814 | 4,328 |
| New Brunswick | 1,609 | 144 | 2,725 | 4,478 |
| Quebec | 22,893 | 1,930 | 36,715 | 61,538 |
| Ontario | 37,387 | 3,531 | 33,678 | 74,596 |
| Manitoba | 3,445 | 243 | 6,331 | 10,019 |
| Saskatchewan | 2,034 | 404 | 3,139 | 5,577 |
| Alberta | 5,226 | 878 | 10,259 | 16,363 |
| British Columbia | 16,697 | 778 | 17,069 | 34,544 |
| Yukon | 81 | 0 | 142 | 223 |
| Northwest Territories | 407 | 0 | 402 | 809 |

# XI. Historical Comparison

This section compares population undercoverage rates for 1971 to 1996. Estimates of net undercoverage are available only since 1991, because 1991 marked the first production of a comprehensive measure of overcoverage following an experimental study in 1986. Table 11.1 shows undercoverage rates for Canada and the provinces and territories for 1991 and 1996. Table 11.2 presents rates by age groups and sex.

**National Population Undercoverage**
**1971 Census – 1996 Census**



The national undercoverage rate was close to 2% for 1971, 1976, and 1981, but then rose to 3.21% in 1986. The increase is thought to be a reflection of both an increase in the construction of dwellings that are difficult to enumerate such as renovated inner-city homes, and a change in the public mood towards government which reduced participation in the census. As a result of the increase in 1986, coverage improvement initiatives were introduced for the 1991 Census. In particular, the use of the address register to provide a separate list of dwellings which should be enumerated helped to keep coverage error near the 1986 level. For the 1996 Census, the introduction of enumeration by a census representative, rather than self-enumeration, in some enumeration areas in large cities served to control undercoverage. Also, moving Census Day from early June to mid-May helped to control undercoverage, because people were more likely to be at home and less likely to be moving.

Several trends are seen from the data in Tables 11.1 and 11.2:

(a)  Among the provinces, British Columbia had the highest rate of undercoverage in every census from 1971 to 1996, excluding 1991 when Ontario had the highest rate.

(b)  Undercoverage rates for the Atlantic and Prairie provinces tend to be lower than the national rate.

(c)  There are two persistent demographic phenomena. Firstly, the undercoverage rate for males is higher than the rate for females in every census year. Secondly, the highest rates of undercoverage are always for young adults in the 20 – 24 year age group.

**National Population Undercoverage**
**1971 Census – 1996 Census**
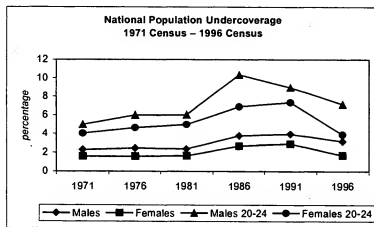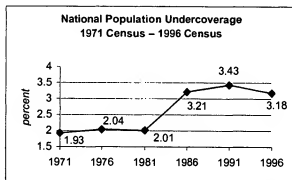


Minor differences in the design of the coverage studies over time mean that the rates in Tables 11.1 and 11.2 are not strictly comparable. Readers should note the following:

(a) **1996:**

    i)    The 1996 Reverse Record Check did not estimate the persons missed on incompletely enumerated Indian reserves. The continued refusal of some Indian reserves to participate in the census makes it increasingly difficult to select a representative sample. Using a statistical model, it is estimated that about 44,000 persons were missed in the 1996 Census on incompletely enumerated Indian reserves.

    ii)    The Temporary Residents Study was cancelled for the 1996 Census because of concerns about the quality of the data, and because it was recognized that the RRC would measure most of this type of undercoverage with sufficient quality.

(b) **1991[1]:** Non-permanent residents were not included in the target population prior to 1991. This group had a higher-than-average undercoverage rate. Had this group not been included in the 1991 Census, it is estimated that the Canada level rate of undercoverage would have been about 0.3 percentage points less. The undercoverage rates for Ontario, British Columbia and Quebec were particularly affected by the inclusion of non-permanent residents.

(c) **1986:** The rates shown here for the 1986 Census differ from the results published in the *User's Guide to the Quality of 1986 Census Data: Coverage*. The rates shown in Tables 10.3 and 10.4 include revisions made after the 1986 publication when incompletely enumerated Indian reserves were included as missed. In the original 1986 publication, they were included as "enumerated" since published provincial census counts included an estimate of persons missed on such reserves.

(d) **1976, 1971:** Census counts for 1971 and 1976 did not include estimates from the Vacancy Check of persons missed in dwellings incorrectly classified as unoccupied. The 1981, 1986, 1991, and 1996 Census counts did include such component. The 1976 population undercoverage rate would have been 1.78% had it included the results of the 1976 Vacancy Check. There was no Vacancy Check in the 1971 Census.

(e) **1971:** For 1971, the age groups above age 24 differ from those shown for the other censuses.

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[1]    Revised estimates of the number of persons missed in the 1991 Census have been produced as a result of analyzing the 1996 Census results. Revised estimates reflect the correction of some cases erroneously classified as missed, the removal of the estimate of persons missed in incompletely enumerated Indian reserves, better estimates of the number of non-permanent residents, and a better measure of overcoverage based on the 1996 results. See Tourigny et al. (1998). The numbers given in this section do not reflect these revisions.

**Table 11.1  Reverse Record Check: Estimated Population Undercoverage for Canada and Provinces/Territories, 1971, 1976, 1981, 1986, 1991 and 1996[1]**

| Province/territory | 1971 | | 1976 | | 1981 | | 1986 | | 1991 | | 1996 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Estimated rate (%) | Standard error (%) | Estimated rate (%) | Standard error (%) | Estimated rate (%) | Standard error (%) | Estimated rate (%) | Standard error (%) | Estimated rate (%) | Standard error (%) | Estimated rate (%) | Standard error (%) |
| **Canada** | **1.93** | **0.09** | **2.04** | **0.10** | **2.01** | **0.09** | **3.21** | **0.13** | **3.43** | **0.12** | **3.18** | **0.09** |
| Newfoundland | 2.25 | 0.72 | 1.10 | 0.39 | 1.74 | 0.45 | 1.92 | 0.33 | 2.47 | 0.30 | 2.45 | 0.29 |
| Prince Edward Island | 1.23 | 1.13 | 0.38 | 0.25 | 1.17 | 0.54 | 2.14 | 0.80 | 1.67 | 0.23 | 1.76 | 0.28 |
| Nova Scotia | 1.33 | 0.45 | 0.86 | 0.34 | 1.05 | 0.34 | 2.15 | 0.34 | 2.25 | 0.36 | 2.70 | 0.27 |
| New Brunswick | 1.65 | 0.56 | 2.16 | -0.37 | 1.81 | 0.30 | 2.71 | 0.33 | 3.71 | 0.42 | 2.49 | 0.28 |
| Quebec | 2.10 | 0.19 | 2.95 | 0.25 | 1.91 | 0.21 | 2.91 | 0.31 | 3.18 | 0.20 | 2.46 | 0.18 |
| Ontario | 1.68 | 0.12 | 1.52 | 0.17 | 1.94 | 0.14 | 3.43 | 0.19 | 4.23 | 0.28 | 3.40 | 0.18 |
| Manitoba | 1.13 | 0.38 | 1.07 | 0.33 | 0.98 | 0.35 | 2.94 | 0.40 | 2.31 | 0.36 | 2.55 | 0.29 |
| Saskatchewan | 1.00 | 0.37 | 1.33 | 0.34 | 0.99 | 0.37 | 2.38 | 0.37 | 2.15 | 0.32 | 3.30 | 0.32 |
| Alberta | 2.55 | 0.44 | 1.49 | 0.26 | 2.54 | 0.36 | 3.00 | 0.32 | 2.51 | 0.27 | 2.99 | 0.24 |
| British Columbia | 2.89 | 0.39 | 3.13 | 0.31 | 3.16 | 0.33 | 4.48 | 0.36 | 3.42 | 0.24 | 4.58 | 0.24 |
| Yukon | .. | .. | .. | .. | .. | .. | .. | .. | 4.12 | 0.58 | 3.92 | 0.51 |
| Northwest Territories | .. | .. | .. | .. | .. | .. | .. | .. | 5.73 | 0.57 | 5.68 | 0.47 |

[1]  Excludes incompletely enumerated Indian reserves in 1996. Includes non-permanent residents and territories in 1991 and 1996. Includes revisions to 1986 original publication. Excludes estimates of persons missed in dwellings incorrectly classified as unoccupied in 1971 and 1976.

..  Figures not available.

**Table 11.2 Reverse Record Check: Estimated Population Undercoverage by Age Group and Sex, 1971, 1976, 1981, 1986, 1991 and 1996[1]**

| Age Group | 1971[2] | | 1976 | | 1981 | | 1986 | | 1991 | | 1996 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Estimated rate (%) | Standard error (%) | Estimated rate (%) | Standard error (%) | Estimated rate (%) | Standard error (%) | Estimated rate (%) | Standard error (%) | Estimated rate (%) | Standard error (%) | Estimated rate (%) | Standard error (%) |
| **Both sexes, all ages** | **1.93** | **0.09** | **2.04** | **0.09** | **2.01** | **0.09** | **3.21** | **0.13** | **3.43** | **0.12** | **3.18** | **0.09** |
| 0 – 4 years | 1.99 | 0.27 | 2.31 | *0.28 | 1.21 | 0.22 | 2.14 | 0.49 | 3.55 | 0.49 | 2.89 | 0.36 |
| 5 – 14 years | 0.90 | 0.13 | 1.20 | 0.16 | 1.23 | 0.21 | 2.08 | 0.26 | 2.49 | 0.27 | 1.45 | 0.14 |
| 15 – 19 years | 2.60 | 0.28 | 1.99 | 0.38 | 2.96 | 0.52 | 3.58 | 0.60 | 3.75 | 0.42 | 3.48 | 0.42 |
| 20 – 24 years | 4.49 | 0.28 | 5.31 | 0.38 | 5.51 | 0.29 | 8.66 | 0.46 | 8.18 | 0.52 | 8.00 | 0.34 |
| 25 – 34 years | 2.50 | 0.20 | 2.85 | 0.28 | 2.31 | 0.28 | 4.51 | 0.35 | 5.65 | 0.35 | 5.81 | 0.29 |
| 35 – 44 years | | | 1.54 | 0.26 | 2.20 | 0.26 | 2.32 | 0.31 | 2.84 | 0.29 | 2.78 | 0.24 |
| 45 – 54 years | 1.40 | 0.15 | 1.22 | 0.33 | 0.81 | 0.23 | 1.58 | 0.29 | 1.61 | 0.27 | 1.90 | 0.21 |
| 55 – 64 years | 1.22 | 0.18 | 0.92 | 0.20 | 0.91 | 0.29 | 2.06 | 0.31 | 1.69 | 0.28 | 2.23 | 0.34 |
| 65 years and over | | | 1.20 | 0.25 | 0.71 | 0.30 | 1.76 | 0.31 | 1.51 | 0.28 | 1.52 | 0.26 |
| | | | | | | | | | | | | |
| **Males, all ages** | **2.27** | **0.12** | **2.46** | **0.17** | **2.37** | **0.13** | **3.75** | **0.16** | **3.95** | **0.16** | **3.89** | **0.14** |
| 0 – 4 years | 1.73 | 0.34 | 2.53 | 0.46 | 1.32 | 0.33 | 2.22 | 0.67 | 2.79 | 0.58 | 2.56 | 0.47 |
| 5 – 14 years | 0.93 | 0.18 | 1.14 | 0.21 | 1.27 | 0.29 | 1.98 | 0.32 | 2.32 | 0.34 | 1.46 | 0.24 |
| 15 – 19 years | 2.71 | 0.39 | 1.93 | 0.48 | 3.12 | 0.68 | 4.09 | 0.74 | 3.55 | 0.60 | 3.68 | 0.43 |
| 20 – 24 years | 4.97 | 0.40 | 5.99 | 0.52 | 6.03 | 0.48 | 10.36 | 0.57 | 8.98 | 0.81 | 9.48 | 0.50 |
| 25 – 34 years | 3.38 | 0.31 | 3.64 | 0.46 | 2.70 | 0.44 | 5.43 | 0.45 | 7.28 | 0.56 | 7.74 | 0.42 |
| 35 – 44 years | | | 2.33 | 0.48 | 3.42 | 0.40 | 3.29 | 0.51 | 3.65 | 0.41 | 3.94 | 0.39 |
| 45 – 54 years | 1.90 | 0.24 | 1.63 | 0.41 | 1.21 | 0.38 | 1.95 | 0.52 | 2.05 | 0.45 | 2.12 | 0.27 |
| 55 – 64 years | 1.37 | 0.28 | 1.28 | 0.34 | 0.91 | 0.40 | 1.88 | 0.47 | 2.04 | 0.44 | 2.50 | 0.54 |
| 65 years and over | | | 1.90 | 0.44 | 0.69 | 0.47 | 1.57 | 0.50 | 1.41 | 0.50 | 1.64 | 0.45 |
| | | | | | | | | | | | | |
| **Females, all ages** | **1.59** | **0.11** | **1.61** | **0.10** | **1.65** | **0.12** | **2.68** | **0.17** | **2.93** | **0.17** | **2.49** | **0.12** |
| 0 – 4 years | 2.25 | 0.40 | 2.07 | 0.36 | 1.10 | 0.33 | 2.06 | 0.62 | 4.35 | 0.71 | 3.24 | 0.55 |
| 5 – 14 years | 0.87 | 0.17 | 1.26 | 0.27 | 1.19 | 0.31 | 2.20 | 0.33 | 2.65 | 0.39 | 1.45 | 0.22 |
| 15 – 19 years | 2.49 | 0.38 | 2.05 | 0.51 | 2.80 | 0.73 | 3.05 | 0.76 | 3.96 | 0.54 | 3.28 | 0.55 |
| 20 – 24 years | 4.01 | 0.37 | 4.62 | 0.48 | 4.98 | 0.43 | 6.89 | 0.72 | 7.36 | 0.71 | 6.45 | 0.48 |
| 25 – 34 years | 1.58 | 0.22 | 2.03 | 0.38 | 1.92 | 0.32 | 3.59 | 0.45 | 3.98 | 0.37 | 3.84 | 0.40 |
| 35 – 44 years | | | 0.72 | 0.24 | 0.93 | 0.31 | 1.33 | 0.32 | 2.01 | 0.35 | 1.62 | 0.28 |
| 45 – 54 years | 0.90 | 0.17 | 0.81 | 0.38 | 0.41 | 0.26 | 1.20 | 0.35 | 1.16 | 0.34 | 1.68 | 0.33 |
| 55 – 64 years | 1.10 | 0.24 | 0.58 | 0.25 | 0.92 | 0.34 | 2.23 | 0.50 | 1.35 | 0.33 | 1.97 | 0.40 |
| 65 years and over | | | 0.64 | 0.38 | 0.71 | 0.42 | 1.89 | 0.44 | 1.58 | 0.36 | 1.43 | 0.32 |

[1]    Excludes incompletely enumerated Indian reserves in 1996. Includes non-permanent residents and territories in 1991 and 1996. Includes revisions to 1986 original publication. Excludes estimates of persons missed in dwellings incorrectly classified as unoccupied in 1971 and 1976.

[2]    Age group for 24 years and over: 25 – 39, 40 – 59, 60 years and over.

# XII. Evaluation of the Reverse Record Check

The results of the largest coverage study, the Reverse Record Check (RRC), can be evaluated by comparing RRC estimates with data on the same characteristic from other sources such as the 1996 Census database. Comparisons with RRC estimates serve to evaluate RRC estimates and to quantify conceptual and measurement differences.

In spite of some conceptual differences between the RRC and the 1996 Census, three comparisons are instructive. Firstly, the RRC estimate of persons enumerated in the 1996 Census can be compared with the count recorded on the 1996 Census database. In order to render the two numbers comparable, reasonable assumptions about the magnitude of the conceptual differences between the two sources can be made. Secondly, the total of immigrants and non-permanent residents enumerated can be compared with the RRC estimate. The two groups are combined since, as a result of respondent error, it is difficult to identify each group separately on the census database. Lastly, census counts of in-, out-, and net interprovincial migrants can be compared with RRC estimates. It is not possible, however, to construct strict comparisons for the last two characteristics since reasonable adjustments for conceptual differences cannot be derived.

Intercensal components of growth estimates from administrative data can be compared with RRC estimates. In particular, the RRC estimate of persons who died between the 1991 Census and the 1996 Census can be compared with the count from vital statistics files.

## A. Comparisons With Published 1996 Census Counts

Since the RRC single stage, stratified design results in unbiased estimators, differences between RRC estimates and estimates from the census are due to sampling error on the part of the RRC estimates, conceptual differences between the two sources, and/or biases in the two sources which result in a systematic underestimation or overestimation.

### 1. Enumerated

The provincial and national comparisons are given in Table 12.1 along with the standard error of the RRC estimate and the $t$-value for testing the hypothesis that there is no difference between the RRC estimate and the comparable census figure. The following adjustments were made to published census counts to account for conceptual differences between the two sources. Random additions from the Vacancy Check Study were removed since they are included in the Census database but are not part of the RRC estimate of enumerated persons. 1996 Census overcoverage is subtracted as the census database contains overcoverage whereas the RRC estimate is based on the number of persons who are enumerated at least once. The census count of persons living outside Canada five years ago (excluding immigrants and non-permanent residents) is subtracted, as the RRC frame does not include these persons. Lastly, 1991 Census overcoverage is added, as it is contained in the RRC estimate via the initial weights for the 1991 Census frame which were not adjusted for this overcoverage.

Nationally, the RRC estimate of persons enumerated in the 1996 Census falls marginally short, 0.08%, of the comparable 1996 Census figure. This is an improvement over 1991 when the RRC underestimated the comparable census figure by 0.46%. Provincially, none of the differences are statistically significant at the 95% level. The difference is greater than 1½ times the standard error for Quebec, Manitoba, Alberta, and British Columbia. The RRC underestimates the comparable census figure in the western provinces, but it overestimates the Quebec census count of enumerated persons. On a percent difference basis among these four provinces, the largest difference is for Manitoba (-1.64%).

The gaps for Quebec, Manitoba, Alberta, and British Columbia are of some concern since they may indicate a bias in the RRC classification (including, for example, the province of residence on Census Day). However, other factors are important. Apart from sampling errors, biases in the adjustments applied to the published census figure to arrive at a conceptually equivalent figure may explain the gap. It was assumed, for example, that the provincial rates of overcoverage

in 1991 were the same as the rates for the 1996 Census. Also, the RRC non-response bias may be relevant since the adjustment for non-response is chosen to give the best result for estimating missed persons rather than enumerated persons. Lastly, there is some evidence for small RRC overestimation in that it was not possible to identify all persons included in the sample from the Immigrant frame and Non-permanent Resident frame who were non-permanent residents five years ago at the time of the 1991 Census.

## 2. Enumerated Immigrants and Non-permanent Residents

Table 12.2 compares RRC and census estimates of enumerated persons for the total of immigrants and non-permanent residents (NPRs). These groups are of particular interest since they have considerably higher rates of undercoverage than the general population. Over all frames, the ratio of enumerated to missed persons is 26.66 while it is 8.95 for the Immigrants frame and 2.90 for the NPR frame.

In general, the RRC overestimates the census count. At the national level, the RRC estimate is higher by 0.77%. Among the provinces with the highest concentration of immigrants and non-permanent residents, the RRC underestimates for British Columbia, by 3.68%, and overestimates for both Quebec (5.23%) and Ontario (2.15%). None of the differences are statistically significant at the 95% level. The provincial differences are close to one standard error whereas the national difference is about half the standard error of the RRC estimate.

## 3. Interprovincial Migration

Table 12.3 compares the RRC estimates of intercensal interprovincial migration with census counts. In general, the RRC overestimates both in-migration and out-migration. The difference is striking for the total number of migrants where the RRC overestimates the census count by almost three times the standard error, a difference that is significant at the 95% level ($t$-prob = 0.005). This result likely reflects the weakness of the census recall approach whereas the RRC uses the actual province of residence in 1991 as recorded in the 1991 Census database. Provincially, in-migration is significantly overestimated for Nova Scotia. The difference is larger than one standard error for all provinces except Saskatchewan. There is a slight underestimation for Newfoundland and Prince Edward Island. The results are similar for out-migration. On a net basis, the RRC tends to underestimate net migration. The difference is close to significance only for Nova Scotia ($t$-prob = 0.079). There is modest overestimation of net migration for Alberta and Prince Edward Island.

# B. Comparison With Population Estimates

## 1. Deceased Persons

Table 12.4 compares the RRC estimate of persons who died in the intercensal period with counts from Vital Statistics (VS). The RRC estimates are consistently higher than the VS counts. At the national level, the RRC overestimates the VS count by 67,460 (6.7%). Provincially, there are significant differences for Nova Scotia and Manitoba: about twice the standard error of the RRC estimate. The RRC estimates and VS counts are close for Newfoundland, New Brunswick, Saskatchewan, and Alberta where the differences are less than half a standard deviation. The RRC overestimates the VS counts for the remaining provinces.

The RRC overestimation of deaths is of some concern because the VS counts are considered to be extremely accurate. Sampling error, of course, plays a role in explaining the difference, but one would expect both overestimation and underestimation of similar magnitude if sampling error was the main explanatory factor.

Some hypotheses relating to the RRC design were investigated. There is no evidence that the sample is poorly distributed within the elderly stratum in the 1991 Census frame. Further, the weight adjustment for invalid age and/or sex on the sampling frame contributes only marginally to the gap. Minor problems with the 1991 Census database such as over-

representation of elderly persons and the lack of an adjustment for overcoverage explain a notable part of the total gap of 67,460 persons. Another hypothesis for explaining the RRC overestimation is that the VS counts themselves are too low. There is some evidence for this from the RRC where 45 of the deaths detected could not be found on the VS files. It may be that these deaths are on the files but that a link could not be achieved. It is also possible that the deaths are not actually on the VS files. The gap would be reduced by 30,428 if these cases represented a category of deaths not covered by the VS files.

## 2. Components of Population Growth

An extensive comparison of RRC estimates of the intercensal components of population growth and population estimates from administrative data sources was produced by the members of the Demography Division. In addition to establishing detailed frameworks for conceptual comparisons, the study provided a means of identifying the ability of the RRC to provide estimates of population growth components, and served as a tool to evaluate the population estimates themselves (see Kerr and Lachapelle, 1999). One result of this evaluation, for example, is the measurement of international temporary migration where, currently, the assumption is made that departures and arrivals balance out over the intercensal period. According to the RRC, the number of such persons almost doubled from 84,287 in 1991 to 154,852 at the time of the 1996 Census. As a result of the RRC estimates, research is underway to develop a demographic method to measure the flow of international temporary and permanent migrants in order to improve annual population estimates.

**Table 12.1  Comparison of 1996 Reverse Record Check Estimate and 1996 Census Count of Enumerated Persons**

| Province/territory | Reverse Record Check | | Census | Comparable census figure[1] | Difference | t-value[2] |
| | Estimated number | Standard error | | | | |
|---|---|---|---|---|---|---|
| **Canada** | **28,611,566** | **58,647** | **28,846,761** | **28,635,289** | **-23,723** | **-0.40** |
| Newfoundland | 549,916 | 5,170 | 551,792 | 550,814 | -898 | -0.17 |
| Prince Edward Island | 131,592 | 2,462 | 134,557 | 134,249 | -2,657 | -1.08 |
| Nova Scotia | 906,272 | 9,452 | 909,282 | 905,399 | 873 | 0.09 |
| New Brunswick | 739,792 | 7,919 | 738,133 | 735,293 | 4,499 | 0.57 |
| Quebec | 7,154,708 | 29,160 | 7,138,795 | 7,103,222 | 51,486 | 1.77 |
| Ontario | 10,681,673 | 51,275 | 10,753,573 | 10,662,747 | 18,926 | 0.37 |
| Manitoba | 1,089,786 | 10,404 | 1,113,898 | 1,107,995 | -18,209 | -1.75 |
| Saskatchewan | 982,715 | 10,194 | 990,237 | 986,648 | -3,933 | -0.39 |
| Alberta | 2,641,223 | 21,613 | 2,696,826 | 2,673,975 | -32,752 | -1.52 |
| British Columbia | 3,639,963 | 22,994 | 3,724,500 | 3,680,121 | -40,158 | -1.75 |
| Yukon | 30,359 | 0 | 30,766 | 30,542 | -183 | - |
| Northwest Territories | 63,566 | 0 | 64,402 | 64,284 | -718 | - |

[1]  Comparable Census Figure = Census – Vacancy Check – Overcoverage 1996 – Outside Canada in 1991 + Overcoverage 1991 where the 1996 overcoverage rate is assumed for 1991.
[2]  A t-value either greater than 1.96 or less than -1.96 indicates that the difference is significant at the 95% level.

**Table 12.2  Comparison of 1996 Reverse Record Check Estimate and 1996 Census Count of Immigrants Plus Non-permanent Residents**

| Province/territory | Reverse Record Check | | | Census | Difference | t-value[2] |
|---|---|---|---|---|---|---|
| | Sample size | Estimated number | Standard error | | | |
| Canada[1] | 2,771 | 1,143,626 | 16,066 | 1,134,833 | 8,793 | **0.55** |
| Newfoundland | 40 | 1,989 | 387 | 2,433 | -444 | -1.15 |
| Prince Edward Island | 30 | 528 | 79 | 572 | -44 | -0.57 |
| Nova Scotia | 50 | 7,273 | 1,206 | 7,827 | -554 | -0.46 |
| New Brunswick | 32 | 2,876 | 790 | 3,486 | -610 | -0.77 |
| Quebec | 464 | 190,074 | 8,646 | 180,624 | 9,450 | 1.09 |
| Ontario | 1,102 | 611,623 | 15,068 | 598,740 | 12,883 | 0.85 |
| Manitoba | 119 | 18,519 | 1,446 | 21,316 | -2,797 | -1.93 |
| Saskatchewan | 85 | 10,027 | 883 | 9,913 | 114 | 0.13 |
| Alberta | 236 | 74,869 | 4,215 | 75,429 | -560 | -0.13 |
| British Columbia | 611 | 225,848 | 7,399 | 234,493 | -8,645 | -1.17 |

[1]   Excludes the territories.
[2]   A t-value either greater than 1.96 or less than -1.96 indicates that the difference is significant at the 95% level.

**Table 12.3  Comparison of 1996 Reverse Record Check Estimate and 1996 Census Count of Interprovincial Migrants**

| Province/territory | Reverse Record Check | | | Census | Difference | t-value[2] |
|---|---|---|---|---|---|---|
| | Sample size | Estimated number | Standard error | | | |
| **In-migration** | | | | | | |
| **Canada[1]** | **2,086** | **936,967** | **27,056** | **861,690** | **75,277** | **2.78** |
| Newfoundland | 43 | 15,248 | 3,585 | 15,940 | -692 | -0.19 |
| Prince Edward Island | 25 | 6,505 | 2,206 | 8,880 | -2,375 | -1.08 |
| Nova Scotia | 185 | 61,431 | 7,064 | 47,005 | 14,426 | 2.04 |
| New Brunswick | 114 | 44,317 | 5,740 | 33,880 | 10,437 | 1.82 |
| Quebec | 153 | 82,937 | 8,651 | 68,405 | 14,532 | 1.68 |
| Ontario | 530 | 211,506 | 12,546 | 192,370 | 19,136 | 1.53 |
| Manitoba | 79 | 42,701 | 6,551 | 42,700 | 1 | 0.00 |
| Saskatchewan | 88 | 49,672 | 6,236 | 46,650 | 3,022 | 0.48 |
| Alberta | 416 | 174,547 | 10,837 | 158,370 | 16,177 | 1.49 |
| British Columbia | 453 | 248,103 | 14,141 | 247,490 | 613 | 0.04 |
| | | | | | | |
| **Out-migration** | | | | | | |
| **Canada[1]** | **2,086** | **936,967** | **26,349** | **861,690** | **75,277** | **2.86** |
| Newfoundland | 264 | 42,978 | 2,442 | 38,340 | 4,638 | 1.90 |
| Prince Edward Island | 175 | 7,318 | 545 | 7,425 | -107 | -0.20 |
| Nova Scotia | 198 | 53,721 | 3,581 | 53,220 | 501 | 0.14 |
| New Brunswick | 202 | 42,914 | 2,786 | 35,725 | 7,189 | 2.58 |
| Quebec | 116 | 109,548 | 11,024 | 105,760 | 3,788 | 0.34 |
| Ontario | 292 | 262,195 | 18,209 | 238,520 | 23,675 | 1.30 |
| Manitoba | 177 | 68,200 | 4,903 | 61,660 | 6,540 | 1.33 |
| Saskatchewan | 226 | 71,787 | 5,025 | 66,235 | 5,552 | 1.10 |
| Alberta | 254 | 171,356 | 9,755 | 155,015 | 16,341 | 1.68 |
| British Columbia | 182 | 106,951 | 8,358 | 99,790 | 7,161 | 0.86 |
| | | | | | | |
| **Net Migration** | | | | | | |
| Newfoundland | 307 | -27,730 | 4,338 | -22,400 | -5,330 | -1.23 |
| Prince Edward Island | 200 | -813 | 2,272 | 1,455 | -2,268 | -1.00 |
| Nova Scotia | 383 | 7,710 | 7,919 | -6,215 | 13,925 | 1.76 |
| New Brunswick | 316 | 1,403 | 6,380 | -1,845 | 3,248 | 0.51 |
| Quebec | 269 | -26,611 | 14,013 | -37,355 | 10,744 | 0.77 |
| Ontario | 822 | -50,689 | 22,113 | -46,150 | -4,539 | -0.21 |
| Manitoba | 256 | -25,499 | 8,182 | -18,960 | -6,539 | -0.80 |
| Saskatchewan | 314 | -22,114 | 8,009 | -19,585 | -2,529 | -0.32 |
| Alberta | 670 | 3,191 | 14,581 | 3,355 | -164 | -0.01 |
| British Columbia | 635 | 141,152 | 16,427 | 147,700 | -6,548 | -0.40 |

[1]  Excludes the territories.
[2]  A t-value either greater than 1.96 or less than -1.96 indicates that the difference is significant at the 95% level.

**Table 12.4  Comparison of 1996 Reverse Record Check Estimate and Vital Statistics Count of Persons Deceased in the Intercensal Period**

| Province/territory | Reverse Record Check | | | Vital Statistics | Difference | t-value[2] |
|---|---|---|---|---|---|---|
| | Sample size | Estimated number | Standard error | | | |
| **Canada[1]** | **1,439** | **1,081,330** | **35,830** | **1,013,870** | **67,460** | **1.88** |
| Newfoundland | 76 | 18,530 | 1,766 | 19,365 | -835 | -0.47 |
| Prince Edward Island | 112 | 6,913 | 1,155 | 5,697 | 1,216 | 1.05 |
| Nova Scotia | 115 | 43,820 | 3,309 | 37,780 | 6,040 | 1.83 |
| New Brunswick | 98 | 29,079 | 3,779 | 28,667 | 412 | 0.11 |
| Quebec | 230 | 273,617 | 18,262 | 253,966 | 19,651 | 1.08 |
| Ontario | 286 | 400,047 | 26,940 | 378,469 | 21,578 | 0.80 |
| Manitoba | 119 | 56,108 | 4,753 | 46,024 | 10,084 | 2.12 |
| Saskatchewan | 100 | 40,143 | 3,303 | 40,543 | -400 | -0.12 |
| Alberta | 94 | 74,640 | 8,298 | 76,125 | -1,485 | -0.18 |
| British Columbia | 209 | 138,433 | 9,620 | 127,234 | 11,199 | 1.16 |

[1]  Excludes the territories.
[2]  A t-value either greater than 1.96 or less than -1.96 indicates that the difference is significant at the 95% level.

**Appendices**

# Appendix A – Products and Services

Packaging census data so they are meaningful and accessible to clients, whether they are government decision-makers, policy analysts, librarians, marketing specialists, researchers, or students, is the key to ensuring the value of the data is maximized. There are several new product and service features for 1996.

## 1. Increased Accessibility Through Electronic Media

More clients asked for census materials to be available in electronic formats which can be used with personal computers. While some key printed products have been retained, more census data were produced on CD-ROM and on diskette. These formats contained Windows-based presentation and tabulation software to make the data easy to use. For the first time, clients were able to obtain information free of charge on the Internet through the Statistics Canada's Web site: http://www.statcan.ca.

## 2. Small Area Data Available Sooner

Census data at smaller levels of geography were made available much sooner than in previous years. On each release day, profile data were available for areas at the community levels (census subdivisions and census divisions) and, one month after their release, data for areas as small as census tracts, enumeration areas and forward sortation areas.

## 3. Census Tabulations Available by Postal Code

As part of the standard product line, basic summary tabulations and area profiles were available for forward sortation areas, which represent the first three characters of the postal code. Data for the full postal code can be obtained as a custom service, subject to confidentiality restrictions.

## 4. New Information Collected in 1996

For the first time, data will be published for unpaid household activities, place of work for all levels of geography, mode of transportation to work, and population groups.

## 5. Improvement of Geography Products

Not only has the quality of many of the maps used for the release of census data been improved, but a map series on federal electoral districts has also been reintroduced. GeoSuite (formerly GeoRef), the Windows-based electronic tool which allows clients to explore the links between different levels of geography, has also been improved with the addition of enumeration area reference lists.

# Bibliography

Lachapelle, R. and D. Kerr (1999). *Census Coverage Studies: A Demographic Evaluation*. Statistics Canada, Demography Division, Ottawa.

Statistics Canada. Coverage. 1991 Census Technical Reports; Reference Products Series. Ottawa: Minister of Industry, Science and Technology, 1994. Catalogue number 92-341E.

Tourigny, J., C. Clark and M. Provost (1998). *Evaluation of the March 1998 Preliminary Results of the 1996 Census Coverage Studies*. Statistics Canada, Social Survey Methods Division, Ottawa.

Tourigny, J., M. Bureau and C. Clark (1998). *Revised Direct Estimates of the 1991 Census Coverage Error*. September 24, 1998, Statistics Canada, Social Survey Methods Division, Ottawa.

Hamel, D. (1997). *Estimating the Population Count and the Number of Occupied Private Dwellings on Indian Reserves Partially Enumerated in the 1996 Census*. Statistics Canada, Social Survey Methods Division, Ottawa.

# Regional Reference Centres

Statistics Canada regional reference centres are located across the country. Each centre has a complete collection of current publications and reference documents which can be consulted or purchased, along with microcomputer diskettes, CD-ROMs, maps and other products and services, including CANSIM.

Each Reference Centre provides a wide range of additional services. On the one hand, the Dissemination Services: a free telephone enquiries line for the most recent basic data. On the other hand, Advisory Services: identification of your needs, establishing sources or availability of data, consolidation and integration of data coming from different sources and development of profiles, analysis of highlights or tendencies and, finally, training on products, services, Statistics Canada concepts and the use of statistical data.

**For more information about the services provided by regional reference centres, you can call or visit the closest centre. The locations are listed below. If you are outside the local calling area, please dial the toll-free number.**

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National toll-free **enquiries** line (Canada and United States): 1 800 263-1136
Telecommunications device for the **hearing-impaired**: 1 800 363-7629
Toll-free **order only** line (Canada and United States): 1 800 267-6677
National toll-free **fax order** line (Canada and United States): 1 800 287-4369
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**List of Statistics Canada Regional Reference Centres**

**Atlantic Region**
*Serving the provinces of Newfoundland and Labrador, Nova Scotia, Prince Edward Island and New Brunswick*
Statistics Canada
Advisory Services
1741 Brunswick Street
2nd floor, Box 11
Halifax, Nova Scotia B3J 3X8
Toll-free number: 1 800 263-1136
Local calls: (902) 426-5331
Fax number: (902) 426-9538
E-mail: atlantic.info@statcan.ca

**Quebec Region**
*Serving the province of Quebec and the territory of Nunavut, except the National Capital Region*
Statistics Canada
Advisory Services
200 René Lévesque Blvd West
Guy Favreau Complex
4th floor, East Tower
Montréal, Quebec H2Z 1X4
Toll-free number: 1 800 263-1136
Local calls: (514) 283-5725
Fax number: (514) 283-9350
E-mail: louise.bournot@statcan.ca

**National Capital Region**
*Serving the National Capital Region*
Statistics Canada
Statistical Reference Centre
R.H. Coats Building Lobby
Holland Avenue
Ottawa, Ontario K1A 0T6
Toll-free number: 1 800 263-1136
Local calls: (613) 951-8116
Fax number: (613) 951-0581
E-mail: infostats@statcan.ca
*If you live outside the local calling area, please dial the toll-free number for your region.*

**Ontario Region**
*Serving the province of Ontario, except the National Capital Region*
Statistics Canada
Advisory Services
Arthur Meighen Building
10th floor
25 St. Clair Avenue East
Toronto, Ontario M4T 1M4
Toll-free number: 1 800 263-1136
Local calls: (416) 973-6586
Fax number: (416) 973-7475

**Prairie Region**
*Serving the provinces of Manitoba, Saskatchewan, Alberta and the Northwest Territories*

*Serving the province of Manitoba:*
Statistics Canada
Advisory Services
Via Rail Building, Suite 200
123 Main Street
Winnipeg, Manitoba R3C 4V9
Toll-free number: 1 800 263-1136
Local calls: (204) 983-4020
Fax number: (204) 983-7543
E-mail: statswpg@solutions.net

*Serving the province of Saskatchewan:*
Statistics Canada
Advisory Services
Park Plaza, Suite 440
2365 Albert Street
Regina, Saskatchewan S4P 4K1
Toll-free number: 1 800 263-1136
Local calls: (306) 780-5405
Fax number: (306) 780-5403
E-mail: statcan@sk.sympatico.ca

*Serving Northern Alberta and the Northwest Territories:*
Statistics Canada
Advisory Services
Park Square, 15th floor
10001 Bellamy Hill
Edmonton, Alberta T5J 3B6
Toll-free number: 1 800 263-1136
Local calls: (780) 495-3027
Fax number: (780) 495-5318
E-mail: ewieall@statcan.ca

*Serving Southern Alberta:*
Statistics Canada
Advisory Services
Discovery Place, Room 201
3553-31 Street NW
Calgary, Alberta T2L 2K7
Toll-free number: 1 800 263-1136
Local calls: (403) 292-6717
Fax number: (403) 292-4958
E-mail: degagnej@cadvision.com

**Pacific Region**
*Serving the province of British Columbia and the Yukon Territory*
Statistics Canada
Advisory Services
Library Square Office Tower
600-300 West Georgia Street
Vancouver, British Columbia V6B 6C7
Toll-free number: 1 800 263-1136
Local calls: (604) 666-3691
Fax number: (604) 666-4863
E-mail: stcvan@statcan.ca